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# SAFETY ENGINEERING

PREVENTION OF NEEDLESS WASTE BY FIRES AND ACCIDENTS

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# SAFETY ENGINEERING

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# *The Accident in the New York Subway*

*The accident on January 6, 1915, caused by the burning out of feeder cables, has led to considerable public discussion and inspections are in progress. It is not the purpose of* SAFETY ENGINEERING *to attempt to anticipate findings of fact. If it is possible to run the subway in the future with more safety to passengers than in the past, the possibility will become evident. In the meantime criticism of the management should be constructive, not merely clamorous.*

DURING the period of five years, six months and twelve days, ended January 12, 1915, the Interborough Rapid Transit Company carried 3,370-478,129 passengers, about equally divided in number between the elevated railroads and the subway. Four fatal accidents due to train operation (excluding suicides and trespassers) occurred during that period, three fatalities on the elevated railroads and one in the subway.

These figures showing a remarkable record for safety in transportation were made public by the Interborough Rapid Transit Company on January 14. The single fatality in the subway occurred on January 6, 1915, when hundreds of passengers were threatened with asphyxiation and many received slight injuries in the panic resulting from a blockade of the line caused by a shutdown in power due to the burning out of feeder cables in two manholes at Fifty-third street and Broadway.

### PUBLIC SERVICE COMMISSION'S STATEMENT.

Up to a few days ago, the only statement given out by the Public Service Commission on the subject of the disaster and its cause was the brief report made on the day of the accident by Clifton W. Wilder, head of the Electrical Bureau of the Commission. Mr. Wilder's statement:

> At 8.01 a. m. today (January 6) feeder cables in two subway manholes at Fifty-third street and Broadway burned out, causing a shutdown of the power in this section of the subway. This stopped traffic in both directions.
>
> Owing to the large amount of insulating material on the cables in these manholes, a very dense smoke was created, which filled the subway at this point, and caused a considerable number of passengers on trains near these manholes to be overcome by smoke. So far we have definite report of one person having died as a result of being overcome by the smoke.
>
> Owing to the destruction of the cables, however, no evidence is left which indicates what may have caused this burn-out. It is impossible to anticipate burn-outs of this character, despite the fact that every precaution is taken in the manufacture and installation of these cables.
>
> It seems to me possible, however, to take steps which will prevent the accumulation of smoke in the subway should an accident of this character occur in the future. I am continuing my investigation, and will shortly make some recommendation along this line to the commission.

When the investigations that are going on are finished, the conclusions reached should constitute an important

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**Rescue work by firemen. Passengers lifted from the subway to be given first aid.**

document with respect to safety methods in the transportation of passengers on underground railroads.

RESCUE AND RESUSCITATION.

The absence of a greater number of fatalities is accounted for by the fact that the trains had not reached the point of blowout and the passengers did not receive the full force of the fumes and gases from the conduits. It is also true that the loss of life despite this fortunate circumstance might have been heavy but for the efficiency of the work of rescue, which began as soon as the volunteers who offered their services could be formed into a relief corps.

In the emergency, no one was found wanting. The pedestrians who helped the first stragglers through the street opening, the firemen and policemen who went down to help the weaker ones, the neighboring business houses which converted their salesrooms into field hospitals, the automobile men who organized ambulance corps among their chauffeurs and used their demonstrator cars for conveyances and the public service corporations which brought their emergency crews and laboring gangs to the scene all played their parts in the pressing work.

NUMEROUS PULMOTORS AT WORK.

The response of the public service companies deserves special commendation. For instance, the first call for pulmotors is said to have come from an Edison electrician, Herbert Tydd, who was in the district. He saw the smoke curling through the grating, recognized the smell of burning insulation and knew what it meant. The electrician's call for pulmotors brought a machine from the Edison company's substation in West Twenty-sixth street at about the time Fire Commissioner Adamson called for all the pulmotors that could be spared. Tydd's message brought one machine; the commissioner's request, with its re-

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**Preparing to use Pulmotor on fireman overcome by smoke while doing rescue work.**

port of the extent of the danger caused a mobilization of the Edison first aid crews from all parts of the city.

Dr. Joseph E. Smith, chief medical officer of the fire department, says that by 10 a. m., all the rescued had been restored to consciousness. They were taken in ambulances to the hospitals as quickly as the pulmotors ceased working on them. Dr. Smith was first to state definitely that there was but one immediately fatal case.

Twenty-eight pulmotors were brought by the Edison men. In addition there were pulmotors from the American Museum of Safety, from the hospitals and from physicians' offices. The United Electric Light & Power Company sent three and the Consolidated Gas Company five. Many of these were brought to the subway in the electric wagons of the Edison Company, the vehicles making the rounds of the various power stations and picking up the machines and men.

George Patrick, a foreman from the Waterside power stations used the pulmotor on 22 persons, many of whom were so overcome, he says, that any other means of resuscitation would probably have failed.

The Consolidated Gas Company's equipment attended about 25 persons. An average of 5 or 15 minutes' work was required to bring the victims back to consciousness.

Before noon the Edison company had assembled in addition to the light delivery wagons which brought the pulmotors, 17 trucks equipped with material for making electrical repairs. These with their crews were placed at the disposal of the Interborough company, but it was soon apparent that the railway workmen and the Interborough's own electric trucks were quite sufficient for the work to be done.

Among the Edison officials who offered their services in re-establishing the train operation were J. W. Lieb, vice-president, Henry Stephenson, superintendent

Courtesy of The New York Edison Company.

**Rescue work at Broadway and Fifty-fifth street, where the subway disaster occurred.**

of the distribution department and Arthur Williams, general inspector and president of the American Museum of Safety.

Just how many lives were saved as a result of the treatment with pulmotors is something that will never be definitely known. Certain it is that the death list would have been high had not the smoke and gases been forced from choked lungs and fresh air and oxygen forced in. One who knows how fatiguing is the effort to resuscitate a person by the manual method, knows too that this mechanical device must be credited with many lives saved.

Courtesy of The New York Edison Company.

**Employes of The New York Edison Company are taught to use Pulmotors for resuscitation. A class in training.**

### PUBLIC INTEREST IN SAFETY MEASURES.

Of passing interest, at least, are some of the letters that have appeared in the newspapers. Extracts from them are given here because they indicate the extent of the public interest in the subject of safety. The selections are typical:

HUDSON MAXIM: As pitch darkness in the tunnel resulted from the interruption of the electric current, it would be a measure of wisdom to have an independent system of lighting the tunnel, the electric current to come from an independent source, so that if another short circuit were to break the power and lighting current the tunnel would not be thrown into midnight darkness, but sufficient light would be supplied to enable the occupants of the trapped trains to get out.

D. M. GOETSCHIUS: The trouble happened in a splicing box. In these the continuity of the copper cables carrying the heavy operating currents for the car motors, etc., is broken by necessary joints. These joints are a combination of mechanical attachment and solder, the former giving necessary strength and the latter insuring a proper electrical connection.

This work is usually very carefully done, and the nature of the connection, similar to the wiped joint on a lead

pipe, giving it a larger cross section at the junction point than that possessed by the cable itself, provides in most cases a large factor of safety. But if, as is sure to happen at some time, the soldering, that is, the electrical connecting, is carelessly done, a latent defect exists in that case, singularly potent for trouble. For observe what may happen:

The splice is made, wiped and taped. Good or bad, it looks the same. It is carrying a certain current, below the cable capacity, and in quantity which the splice, though defective, will pass without heating. So all is well at the time. Later the load on the cable is increased; that is practically always the case with feeders, certainly in the subway, where the line load has come up so rapidly.

The cable has a known capacity which the engineers will not permit to be exceeded, but our defective soldered joint has by reason of its defect a higher resistance than the cable and begins to heat. A cable may heat considerably without serious results, but not so a soldered splice. The solder melts off, still further increasing the resistance, and immediately the mechanically attached ends of the cable get hotter, melt and "blow," arcing and producing in a confined space the temperature and effects of an electric furnace.

The other cables in the well are melted through and multiply disastrous effects, and everything within range of the arcing cable terminals is vaporized, turned into gases, which are driven semi-explosively into any space available; in the subject case the subway tunnel.

Some remedies suggest themselves. Electrical welding instead of soldered joints at all important points is one. I am aware of technical objections to this, but they should mean little to a corporation with the responsibilities, revenues and engineering resources of the Interborough, and the results are certain.

In the meantime a device might be installed contiguous to the splices that would alarm the nearest station in the event of any undue rise in temperature and permit proper measures being taken in time. It is possible to ascertain electrically the resistance of any cable joint, and this may sometimes be done, but I have seen many, many joints made and put into service without any such precaution, and its neglect is too easy to make it reliable.

DAVID T. MARSHALL: In 1900 I was employed by Mr. Edison at his laboratory in Orange, N. J., as a chemist. The first problem given me for solution was to produce an insulating substance which should have the following four properties: It should be fireproof, waterproof, flexible, and a good insulator. Mr. Edison had had one or more men working on this

By Courtesy of The Evening Sun, New York.

problem for a year or more before it was given to me. At the same time I was working on the problem, R. A. Fessenden, who has since distinguished himself as an inventor and electrical expert, was working independently on the problem at the Edison Laboratory. After two years spent on the insulation problem, I came to the conclusion that a combination of the four properties in an insulating material was an impossibility.

Asbestos is fireproof and when dry is a good insulator while at the same time flexible, but it is not waterproof, and for underground work and where there is dampness it is useless. If the attempt

By Courtesy of The New York Tribune.

is made to make it waterproof one has to use rubber or oily or resinous substances and then it is no longer fireproof. The same may be said of mica and combinations of the same with silicate of soda. It is a see-saw between the four incompatible properties, the gain in one being always at the expense of the other. Mr. Edison and his assistants tried for years to find the desired substance, literally trying every kind of gum, asphalt, resin oil, and the combinations of the same by chemical means. For all I know he may be at it yet. I have tested every product and every insulation on the market, and every one fails somewhere.

HARRY ALEXANDER: It is an undeniable fact that short circuits are more apt to happen in the manhole than at any other point. This being the case, these manholes in every instance should have forced ventilation, leading direct to the open air. The doors for these manholes or covers, as the case may be, should be made preferably of reinforced concrete slabs, rather than iron, inasmuch as there is no inflammable material that will withstand the disrupting effect of the electric arc. A concrete door would prove more effective than iron in withstanding flame and gas pressure due to a short circuit in a manhole compartment well ventilated.

C. A. WEBBER: An automatic sprinkler system might be installed over the current cables which would quench the burning insulation. This is on the assumption that the short circuit interrupts the current, and so the use of water would not be dangerous, and on the further assumption that the intense heat of a short circuit does not instantly complete the combustion and release the fumes, as in the explosion of gunpowder.

JAMES R. PITCHER: New York received a warning, when hundreds of passengers were suffocated in the subway. The next occurrence may be far more serious in loss of life due to a similar cause—suffocation. No time should be lost in remedying the most serious defect of the subway, viz., lack of suitable ventilation at all times.

PROF. W. I. SLICHTER: From what I know of the accident I would say that most people were overcome because of the incomplete combustion of the burning material. One must also consider that there was a great number of people in a confined space, with the result that the individual supply of air was cut down. This alone would do the damage. Probably the burning insulation did more harm than the copper. The rubber, cotton and varnish that are present in most insulating material would give off a number of irritating gases which could soon work havoc in a confined space.

By Courtesy of The New York World.

# A COMBUSTIBLE TERMINAL

THE ferry house of the Philadelphia & Reading Railroad in Camden, N. J., was destroyed by fire on January 3.

To the south of the ferry slip was the lumber yard of Coles & Co., and to the south of that Dialogues' ship yard. The fire started in the northwest corner of the ferry house in a room used by employes, presumably from a cigar or cigarette stump. It was discovered by an employe. An attempt was made to use a 3-gallon extinguisher, but, upon being reversed, the extinguisher is said to have exploded, indicating an excessive gas charge from the mixture.

The alarm was struck through box 362, which functioned properly, but the sounding of an alarm was delayed through the efforts of employes, who attempted to control the fire. The succeeding alarms brought out the entire Camden force, seven companies, and aid was asked and received from Philadelphia and from Gloucester, N. J. Three companies, Nos. 18, 21 and 27, were sent from Philadelphia.

The firemen were handicapped by the delay in sounding the alarm, by the construction and physical condition of the buildings, and by the open yard with piles of lumber adjoining. A stiff breeze blowing from the northwest carried the

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**Top—Burned cars at P. & R. station, Camden, N. J. Center—Piers of P. & R. at Camden, N. J., after fire. Bottom—Remains of other cars that were destroyed.**

flame in the direction of these exposures.

The fire was discovered about 5.45 a. m. and was under control by noon, but companies were detailed all day and night wetting down the ruins.

PROPERTY DESTROYED.

The property destroyed was as follows:

Ferry house of P. & R. (frame).

Office building of P. & R. (frame).

Train shed of P. & R. (frame).

About 20 P. & R. passenger coaches on track in train shed. (The steel coaches offered quite a contrast in fire-resisting ability compared to the wooden coaches to which they were coupled.)

Planing mill of Coles & Co. (brick two sides, frame two sides).

Carpenter shop, Coles & Co. (frame).

Small part of Dialogues' shipyard.

One steam fishing boat.

The estimated loss is $500,000.

It is worthy of note that, had an alarm been sounded from any other part of Camden during the height of this fire, not a single piece of apparatus would have been available to respond, despite the fact that many large buildings are on the Camden water front, to the north of the ferry site.

About three hours after the Camden fire started, a fire broke out in one of the largest lumber yards in the city of Philadelphia for which five alarms were sounded and this fire raged until long past noon. This fire called into service 17 engine companies, six trucks, the chief engineer, the deputy chief and 7 battalion chiefs, which in view of the three companies and battalion chief the Philadelphia department had sent to Camden, would have made a serious condition in Philadelphia if further aid had been needed for another fire in Camden.

The occurrence of two fires of such proportions, offers a striking example of what can occur at almost the same moment, and emphasizes the need of preparations to meet such emergencies.

Lessons taught by serious fires are not learned by railroads, or by others, unless the flimsy and inflammable structures consumed are replaced with fire-resistive buildings and full fire protection.

In the November and December numbers of SAFETY ENGINEERING, the Philadelphia & Reading Railway's misfortune by the fire on its pier, No. 38 South Wharves, received attention. Pier No. 38 was not completed at the time of the fire and owing to a wooden roof, piles of building material and lumber and a heavy northwest wind, the structure soon became a furnace. It was not the builder's intention to protect the steel columns which accounted for the fact that they collapsed promptly. The Philadelphia & Reading now has the task of rebuilding two of its water-front properties and what it will endeavor to accomplish in the way of fire-resistive work the specifications for the new structures will show.

## UNPROTECTED OPENINGS.

The seed house and hull house of the Southern Cotton Oil Company in Memphis, Tenn., was damaged by fire recently. The value of building and

contents was $80,000; the loss by fire about $35,000. Construction of the building favored the spread of the fire, as the conveyor through the concrete wall left unprotected openings. Both buildings were constructed of wood, with gravel roofs. Fire was discovered by a negro employe at 1.12 p. m. The alarm reached the fire department by telephone. The fire burned six hours. There were 13 hydrants on the property for fire-fighting purposes.

# INVESTIGATION OF FIRE DANGERS

## PROGRESS OF THE WORK OF EDUCATION ALONG FIRE PROTECTION LINES

THE engineers of the Committee on Fire Prevention of the National Board of Fire Underwriters inspect the fire dangers in the congested value districts of cities of the United States that have 25,000 and more population. In 1914 the inspections numbered 38. Supplemental reports on 10 cities and follow-up bulletins on 53 cities were issued.

The board reports that the bulletins to members indicate generally a gratifying agreement with most of the recommendations contained in the reports. Municipalities are taking more interest in following up the recommendations submitted.

The work of education along fire protection lines, which has been undertaken by the board, is gradually showing results, but it will not be possible to form a definite opinion as to the full effect of this follow-up work until sufficient time has elapsed to permit improvements to be made.

According to the report of the committee at the meeting of the national board in 1914, the borrowing of engineers from the staff to consider municipal improvement problems has had a good effect. Engineer Goldsmith, who had a leave of absence to assist in the plans for the Boston high-pressure service, returned to the service of the national board, after a change in the administration of affairs at Boston. One of the board's engineers is aiding in the installation of the high-pressure service at the grounds of the Panama-Pacific Exposition. He may be there several months.

### INVESTIGATED FEDERAL BUILDINGS.

Faith is reposed so much in the unbiased reports of the board's engineers that several months ago a request was forwarded by a special committee of officials in Washington—appointed by the secretary of the interior—that a party of engineers from the National Board of Fire Underwriters and the Underwriters' Laboratories make a study of the fire hazards and the necessary fire protection of certain of the public buildings at the national capital, including the patent and pension offices, and the general land office buildings of the department of the interior.

The work and the preparation of the report occupied about two weeks, and they were appreciated by the secretary of the interior, who asked later for specifications and estimates, with a view to interesting Congress for the appropriations.

About a year ago the executive committee of the national board appointed an engineer-at-large, whose duty is to visit the cities reported on and use his influence in seeing that the recommendations in the reports receive favorable consideration by the proper authorities. Undoubtedly the plan has resulted in more cities taking up the recommendations seriously.

### IMPROVEMENT WROUGHT BY INSPECTIONS.

Taking the country as a whole, the reinspection of cities has invariably observed improvement. Frequently a better type of construction has replaced old and weak buildings, and the installation of adequate fire prevention equipments has improved the physical hazards. A general bettering of the distribution system and an improvement in the water supply of cities have been noted.

The work of Professor Ira H. Woolson, consulting engineer of the board, has increased rapidly since this position was created about four years ago, and the situation in New York City—as regards the framing of a new building code—has been carefully looked after in addition to the work which has been done by Prof. Woolson in shaping and recommending changes in the building codes proposed for adoption in other cities.

Every year the engineers of the national board are asked by city officials to designate engineers to conduct tests of automobile pumping engines. A request is sent regularly by the New York Civil Service Commission for the services of

an expert to act as an examiner of candidates for the position of engineer of steamer, a position in the New York fire department.

The annual cost of the work of the Committee on Fire Prevention is about $65,000, the salaries of the twelve field men aggregating about $23,000. Their expenses on the road and for board amount to about $18,000 a year. The salaries of the six men of the office staff aggregate about $13,000. The amount of the cost indicates that the work is being conducted on a comparatively economical basis.

METHODS OF INSPECTION EMPLOYED.

As a rule the engineers go out in parties of four, and they take from three weeks to three months to inspect a city, depending upon its size and the general conditions encountered. The visiting parties comprise, as a rule, a hydraulic, a structural and a mechanical engineer, besides an assistant.

The engineers in the employ of the board have been graduated from technical institutions, and previous to their employment by the Committee on Fire Prevention they have had practical experience in engineering lines. It is now twenty-four years that the board has been carrying on this educational fire protection work. The campaign was started by the old committee of fire department of water supply of the board, back in 1890. Until February 25, 1904, that committee continued to have supervision of the work. The scope of the work was then enlarged and a committee of 20 was appointed. In 1906 the work of the two committees was taken over by the Committee on Fire Prevention, and since that date all reports have been issued under the jurisdiction of that committee.

In many sections of the country the reports are used by rating organizations for classification purposes, and they are to be valuable to the board in the future in checking up the work of the loss bureau and the classification statistics. The work of the fire prevention committees of fire underwriters has commended itself generally to Federal, State and municipal authorities.

CITIES INSPECTED BY FIRE INSURANCE ENGINEERS, WITH DATES OF REGULAR, SUPPLEMENTAL AND SPECIAL REPORTS.

Adrian, Mich. Jan., 1912.
Akron, O. July 1912; Sept., 1914.
Alameda, Cal. Oct., 1910.
Albany, N. Y. Jan., 1905; April, 1907; Dec. 1908; April, 1912; May, 1914.
Alexandria, Va. Aug., 1913; Oct., 1914.
Allegheny, Pa. Nov., 1904; Dec., 1906.
Altoona, Pa. Feb., 1908; July, 1914.
Amsterdam, N. Y. Sept., 1913; Apr., 1914.
Asbury Park, N. J. Aug., 1912; Sept., 1912; July, 1914.
Atchison, Kan. Oct., 1912.
Atlanta, Ga. March, 1905; Jan., 1907; Aug., 1909; May, 1914.
Atlantic City, N. J. Mar., 1913; July, 1914.
Auburn, N. Y. June, 1906.
Augusta, Ga. May, 1905; Feb., 1907; Feb., 1913.
Augusta, Me., Oct., 1907.
Austin, Tex. June, 1910.

Bakersfield, Cal. July, 1905.
Baltimore, Md. Sept., 1905; Feb., 1910; June, 1912.
Bangor, Me. Oct., 1907; May, 1914.
Battle Creek, Mich. Feb., 1912.
Bay City, Mich. Dec., 1911.
Bayonne, N. J. Apr., 1914.
Berkeley, Cal. Oct., 1910.
Berlin, N. H. Nov., 1907.
Beaumont, Tex. Aug., 1910.
Binghamton, N. Y. Dec., 1908.
Birmingham, Ala. April, 1905; May, 1907; Aug., 1909; Mar., 1911; Apr., 1913.
Bloomington, Ill., Dec., 1912; Nov., 1914.
Boston, Mass. Jan., 1906; Nov., 1908; Feb., 1911; Apr., 1911.
Bridgeport, Conn. Sept., 1904; Dec., 1905; Apr., 1907; Sept., 1908; Aug., 1912; July, 1914.
Brockton, Mass. July, 1908.
Brunswick, Ga. March, 1907; May, 1912.
Buffalo, N. Y. Dec., 1904; Apr., 1907; Oct., 1909.
Burlington, Vt. Dec., 1907.
Butte, Mont. Nov., 1910.

Cambridge, Mass. Nov., 1906.
Camden, N. J. Feb., 1908; Jan., 1911; Sept., 1914.
Canton, Ohio. Jan., 1912; Sept., 1914.
Central Falls, R. I. Aug., 1908.
Charleston, S. C. April, 1906.
Charleston, W. Va. Oct., 1909; Aug., 1914.
Charlotte, N. C. April, 1907.
Chattanooga, Tenn. July, 1907.
Chelsea, Mass. Nov., 1906; Oct., 1912; April, 1914.
Chester, Pa. May, 1914; Oct., 1914.
Chicago, Ill. Dec., 1905; Aug., 1912; July, 1914.
Chicago Heights, Ill. July, 1912.
Cincinnati, Ohio. Oct., 1904; May, 1911.
Clarksburg, W. Va. Feb., 1909; Jan., 1911.
Cleveland, Ohio. July, 1906; Feb., 1908; Oct., 1912; Aug., 1914.

Colorado Springs, Colo. Feb., 1911.
Columbia, S. C. April, 1907.
Columbus, Ga. April, 1907.
Columbus, Ohio. Sept., 1911; Sept., 1914.
Concord, N. H. July, 1906.
Council Bluffs, Iowa. June, 1913.
Covington, Ky. July, 1911.
Dallas, Tex. March, 1910; Dec., 1910; June, 1911; July, 1911; Dec., 1913.
Danville, Ill. Dec., 1913; Nov., 1914.
Danville, Va. June, 1911.
Davenport, Ia. Dec., 1909.
Dayton, Ohio. March, 1909; Aug., 1914.
Denver, Colo. Aug., 1906; Dec., 1910.
Derby, Conn. March, 1907.
Des Moines, Ia. Jan., 1909.
Detroit, Mich. March, 1906; Nov., 1911.
Dubuque, Ia. Nov., 1909.
Duluth, Minn. Jan., 1908; Nov., 1914.
East Orange, N. J. May, 1914.
East St. Louis, Ill. Dec., 1914.
Elizabeth, N. J. Oct., 1909.
Elmira, N. Y. July, 1910.
El Paso, Tex. April, 1905; March, 1910.
Englewood, N. J. Oct., 1912.
Erie, Pa. Nov., 1908.
Evanston, Ill. July, 1912.
Evansville, Ind. March, 1911; March, 1912.
Everett, Mass. Dec., 1906.
Fall River, Mass. April, 1908.
Fitchburg, Mass. Dec., 1907.
Flint, Mich. Dec., 1911.
Fort Smith, Ark. Jan., 1914.
Fort Wayne, Ind. Feb., 1911; Oct., 1913; Sept., 1914.
Fort Worth, Tex. April, 1910; Dec., 1910.
Freeport, Ill. Oct., 1909; Aug., 1912.
Fresno, Cal. July, 1905; Feb., 1911.
Galveston, Tex. April, 1910; Mar., 1912; Apr., 1913; Apr., 1914.
Glens Falls, N. Y. Aug., 1912; April, 1914.
Gloucester, Mass. July, 1907.
Grand Rapids, Mich. July 1907; Oct., 1911; Dec., 1914.
Great Falls, Mont. Sept., 1910.
Guilford, Conn. Aug., 1913.
Hackensack, N. J. May, 1911; Dec., 1913.
Hagerstown, Md. Nov., 1909.
Hamilton, Ohio. March, 1912.
Hannibal, Mo. July, 1912; Nov., 1914.
Harrisburg, Pa. Sept., 1906; Dec., 1913; June, 1914.
Hartford, Conn. Mar., 1908.
Haverhill, Mass. Aug., 1907; Oct., 1914; Dec., 1914.
Helena, Mont. Oct., 1910.
Henderson, Ky. March, 1912.
Hoboken, N. J. Sept., 1904; April, 1906; Mar., 1914; July, 1914.
Hornell, N. Y. Oct., 1910.
Hot Springs, Ark. Nov., 1913; Feb., 1914.
Houston, Tex. June, 1910.
Indianapolis, Ind. Oct., 1906; Nov., 1912; Sept., 1914.
Jackson, Mich. Oct., 1911.
Jackson, Miss. July, 1914.
Jacksonville, Fla. March, 1907; May, 1911; Mar., 1913.
Jamestown, N. Y. Aug., 1910.
Jersey City, N. J. April, 1905; Sept., 1906.
Johnstown, Pa. Mar., 1914; July, 1914.
Joliet, Ill. Dec., 1912.
Joplin, Mo. Oct., 1912.
Kalamazoo, Mich. Jan., 1912.
Kansas City, Kan. Sept., 1907; Mar., 1913.
Kansas City, Mo. Aug., 1907; March, 1913.
Keene, N. H. July, 1906.
Key West, Fla. June, 1907.
Knoxville, Tenn. May, 1905; May, 1913.
La Crosse, Wis. Oct., 1911.
Lambertville, N. J. Aug., 1906.
Lancaster, Pa. Dec., 1909.
Lansing, Mich. Dec., 1911.
Lawrence, Mass. July, 1908.
Lewiston, Me. Aug., 1907.
Lexington, Ky. Dec., 1910.
Lima, Ohio. July, 1912.
Lincoln, Neb. Nov., 1907.
Little Rock, Ark. June, 1911; Nov., 1913; Aug., 1914.
Lockport, N. Y. Feb., 1911.
Los Angeles, Cal. July, 1905; May, 1910; Dec., 1910.
Louisville, Ky. Sept., 1906; May, 1909.
Lowell, Mass. Sept., 1908; June, 1914.
Lynchburg, Va. June, 1907.
Lynn, Mass. Oct., 1908; Dec., 1914.
Macon, Ga. Mar., 1907; May, 1911.
Madison, Wis. Nov., 1911.
Malden, Mass. Dec., 1906.
Manchester, N. H. Nov., 1909.
Manistee, Mich. May, 1912.
Marblehead, Mass. Jan., 1908.
McKeesport, Pa. Nov., 1910.
Memphis, Tenn. June, 1905; March, 1906; Aug., 1909; Mar., 1914.
Meridian, Miss. Aug., 1914.
Milwaukee, Wis. Dec., 1912.
Minneapolis, Minn. Nov., 1907; Aug., 1910; Oct., 1911; July, 1913.
Missoula, Mont. Nov., 1910.
Mobile, Ala. May, 1905; July, 1909.
Montgomery, Ala. May, 1907; Apr., 1914.
Montpelier, Vt. June, 1911.
Muskegon, Mich. Dec., 1911.
Muskogee, Okla. May, 1911.
Nashville, Tenn. Feb., 1907.
Newark, N. J. March, 1905; Aug., 1908; Nov., 1913; May, 1914.
Newark, Ohio. May, 1912.
New Bedford, Mass. March, 1908.
New Britain, Conn. May, 1911.
New Brunswick, N. J. Dec., 1909.
Newburgh, N. Y. June, 1906.
Newburyport, Mass. May, 1910.
Newcastle, Pa. Sept., 1914.
New Haven, Conn. May, 1908; Mar., 1914; June, 1914.
New Orleans, La. June, 1905; May, 1909.
Newport, Ky. July, 1911.
Newport, R. I. June, 1908.
Newton, Mass. Oct., 1911.
New York—
Manhattan and Bronx. Nov., 1905; Jan., 1908; Feb., 1908; April, 1908.
Brooklyn and Queens. May, 1906; Apr., 1908; Dec., 1908; Dec., 1911.
All Boroughs, Fire Dept. May, 1908; June, 1913.
Niagara Falls, N. Y. Oct., 1910.

Norfolk, Va. June, 1904; Nov., 1906; April, 1909; May, 1912; June, 1913.
Norwich, Conn. Dec., 1910; March, 1911; July, 1914.
Norwood, Ohio. May, 1909.
North Adams, Mass. Mar., 1914.
North Tonawanda, N. Y. Nov., 1906.
Oakland, Cal. Oct., 1905; Oct., 1910.
Oak Park, Ill. June, 1912.
Ocean Grove, N. J. Nov., 1912.
Ogden, Utah. Dec., 1909.
Ogdensburg, N. Y. Aug., 1912; Apr., 1914.
Oklahoma City, Okla. April, 1911.
Omaha, Neb. Dec., 1907; Apr., 1913; Aug., 1913.
Orange, N. J. May, 1914.
Oshkosh, Wis. Nov., 1913.
Oswego, N. Y. Aug., 1908.
Owensboro, Ky. Feb., 1912.
Paducah, Ky. Nov., 1911.
Parkersburg, W. Va. Feb., 1910; Aug., 1910.
Passaic, N. J. May, 1910; Aug., 1911; May, 1914.
Paterson, N. J. Nov., 1904; July, 1908; June, 1913; May, 1914.
Pawtucket, R. I. Aug., 1908.
Pensacola, Fla. May, 1907.
Peoria, Ill. Aug., 1909.
Perth Amboy, N. J. Feb., 1914.
Petersburg, Va. June, 1907.
Philadelphia, Pa. July, 1906; March, 1907; May, 1907; July, 1911; July, 1914; Sept., 1914; Dec., 1914.
Phoenix, Ariz. March, 1911.
Pine Bluff, Ark. Feb., 1914.
Pittsburgh, Pa. Aug., 1904; June, 1909; Mar., 1913; Dec., 1914.
Pittsfield, Mass. Oct., 1914.
Plainfield, N. J. May, 1914.
Plattsburgh, N. Y. April, 1912.
Portland, Me. Sept., 1907; March, 1908; Oct., 1913; May, 1914.
Portland, Ore. Feb., 1906; Dec., 1910.
Portsmouth, N. H. June, 1906.
Portsmouth, Ohio. Feb., 1912.
Poughkeepsie, N. Y. Aug., 1911.
Providence, R. I. Feb., 1905; Dec., 1905; Dec., 1906; Nov., 1912; Apr., 1914.
Quincy, Ill. Jan., 1910.
Quincy, Mass. Jan., 1907.
Racine, Wis. Jan., 1913.
Rahway, N. J. Oct., 1911.
Raleigh, N. C. May, 1911; June, 1913.
Rapid City, S. D. Oct., 1911.
Reading, Pa. Nov., 1908; Feb., 1914; June, 1914.
Richmond, Va. April, 1906; June, 1913; July, 1914.
Roanoke, Va. June, 1907.
Rochester, N. H. June, 1906.
Rochester, N. Y. Dec., 1904; Feb., 1909; Oct., 1909; Jan., 1914; May, 1914.
Rockford, Ill. Aug., 1909.
Rome, Ga. April, 1907.
Sacramento, Cal. Jan., 1911.
Saginaw, Mich. Dec., 1911.
St. Augustine, Fla. Feb., 1907.
St. Joseph, Mo. Oct., 1907; May, 1913.
St. Louis, Mo. Mar., 1905; Mar., 1906; Mar., 1912; Nov., 1914.
St. Paul, Minn. Oct., 1907; Oct., 1914.
Salem, Mass. July, 1907; Oct., 1914.
Salt Lake City, Utah. Dec., 1909.
San Antonio, Tex. April, 1910.
San Diego, Cal. July, 1905; May, 1910.
San Francisco, Cal. Oct., 1905; July, 1910; Jan., 1914.
San Jose, Cal. Oct., 1910.
Savannah, Ga. May, 1905; Feb., 1907; May, 1912; Jan., 1913.
Schenectady, N. Y. Feb., 1909; May, 1914.
Scranton, Pa. Aug., 1906; May, 1908; Dec., 1912; Dec., 1913; June, 1914.
Seattle, Wash. March, 1906; Feb., 1910.
Sheboygan, Wis. Dec., 1914.
Shreveport, La. May, 1911; Nov., 1914.
Sioux City, Ia. Sept., 1913.
Skowhegan, Me. July, 1906.
Somerville, Mass. Nov., 1906.
South Bend, Ind. Jan., 1911.
South Omaha, Neb. Dec., 1907; Aug., 1913.
Spokane, Wash. April, 1906; Aug., 1910.
Springfield, Ill. Dec., 1908.
Springfield, Mass. Aug., 1906; Feb., 1913; May, 1914.
Springfield, Mo. Sept., 1912.
Springfield, Ohio. April, 1912.
Stockton, Cal. July, 1905; Dec., 1910.
Superior, Wis. Jan., 1908; Nov., 1914.
Syracuse, N. Y. Dec., 1904; Feb., 1909; Feb., 1914; May, 1914.
Tacoma, Wash. Feb., 1906; Mar., 1910.
Tampa, Fla. Apr., 1907; Apr., 1913.
Taunton, Mass. Feb., 1907.
Terre Haute, Ind. March, 1911.
Texarkana, Ark.-Tex. Jan., 1914.
Toledo, Ohio. Dec., 1908; Nov., 1914.
Tonawanda, N. Y. Nov., 1906.
Topeka, Kan. Aug., 1911.
Trenton, N. J. Jan., 1907; July, 1914.
Troy, N. Y. Jan., 1905; April, 1907; Feb., 1909; June, 1912; Dec., 1913; Apr., 1914.
Union, N. J. Mar., 1914.
Utica, N. Y. March, 1908; Oct., 1913; Apr., 1914.
Vicksburg, Miss. June, 1905.
Waco, Tex. April, 1910.
Washington, D. C. Aug., 1905.
Waterbury, Conn. Sept., 1910.
West Hoboken, N. J. Mar., 1914.
Wheeling, W. Va. May, 1907; July, 1914.
Wichita, Kan. Sept., 1911.
Wilkes-Barre, Pa. Oct., 1906.
Williamsport, Pa. May, 1914; Oct., 1914.
Wilmington, Del. Jan., 1907; Apr., 1914; July, 1914.
Wilmington, N. C. April, 1907; July, 1909.
Winsted, Conn. Apr., 1913.
Winston-Salem, N. C. July, 1913.
Woonsocket, R. I. Jan., 1911.
Worcester, Mass. Feb., 1905; May, 1907; Dec., 1910; Jan., 1913; Apr., 1914.
Yonkers, N. Y. Aug., 1911.
York, Pa. Jan., 1910.
Youngstown, Ohio. Aug., 1912; Aug., 1914.

# HORIZONTAL FIRE ESCAPE

## SAFETY FOR HOSPITAL PATIENTS IN CASE OF FIRE

IT may seem incredible, but it is a fact, nevertheless, that up to the present time hospitals and similar institutions have never been provided with any practical means of escape from fire for such of the inmates as were bedridden on account of illness or were otherwise helpless, such as the blind, imbeciles, babies, the very aged, etc. In other words, hospital patients generally who are incapacitated from moving about are absolutely at the mercy of a fire, should one take place. The nearest approach to a provision for safety for these people which had ever been suggested was a type of steel chute similar to the cylindrical "down and outs" one sees at Coney Island and recreation resorts into which it was proposed to throw those who were so incapacitated that they could not go down the fire escapes themselves and when they had slid down to the ground the hospital attendants were expected to carry them away and make some other provision for them.

These chutes besides rusting to such an extent as to prove unserviceable for their purpose were found to endanger the patients physically. In fact, it has been proved that there was danger of the latter getting jammed in them and suffocating. Therefore, they have never come into general use.

Some three years ago, shortly after the Triangle fire, H. F. J. Porter, M. E., consulting engineer, brought to the attention of the public a system of "Horizontal Escape," which he had introduced into high and crowded factory buildings and which obviated the necessity of taking people downstairs at all in case of fire, as he had found that elevators, stairways and fire escapes under emergency conditions were almost always sources of congestion and panic and frequently loss of life and that such "vertical escape" down through the fire in order to get away from it it was irrational.

The horizontal escape which Mr. Porter proposed was obtained by introducing a dividing wall on each floor. In case a fire should occur on any floor on one side of the wall, a fire alarm signal would notify all the people on all the floors on that side of the wall and they would immediately pass through the doorway into the safe section of the building, close the fireproof door after them, thus forming a barrier against the fire, and they would then be as safe as they would be in a separate building in which there were no fire and from which they could reach the ground at their convenience by elevators and stairways which would be in normal condition. The principle involved was similar to that utilized in the watertight bulkhead of the ocean steamer.

The Department of Charities of New York City had at the time referred to asked for an appropriation of over $200,000 at the recommendation of the Fire Department, to install fire escapes and cylindrical chutes upon their principal buildings, when Mr. McAneny, then President of the Borough of Manhattan, had the request held in abeyance, while he asked Mr. Porter if his dividing wall and horizontal exit system of life protection which had proved to be so serviceable for factories could not be adapted to hospitals.

Mr. Porter at this time read a paper on the subject before the American Society of Mechanical Engineers at which, after discussion, it was the consensus of opinion that this principle was practically the only one which offered any means of escape from fire for the physically helpless inmates of institutions such as hospitals who by proper arrangement could be wheeled on their beds through the doorway in the dividing wall to safety with scarcely any disturbance whatever. An attractive feature of this system was also that the cost of installation would be very much less than that of the other appliances, for in many instances

dividing walls already existed which could be developed into fire barriers with very little expense.

On the strength of this engineering endorsement and the satisfactory results which were being obtained from the installation of this safety measure elsewhere, Mr. McAneny brought the matter to the attention of the city officials.

It has taken considerable time for the authorities to have the subject thoroughly investigated by their experts, who have finally passed upon the project favorably and urgently recommended its adoption, as they feel that there is now available a measure which will provide safety to the helpless in hospitals. The city cannot allow its wards to remain in jeopardy and Mr. Porter and his associate, A. L. A. Himmelwright, have been commissioned to undertake the work of installing the system in the buildings of the Department of Charities.

The Department of Correction, having buildings of a character similar to those of the Department of Charities and in some instances located contiguous to them, has asked the Board of Estimate for permission to have this work extended into its buildings. Bellevue Hospital has already had its buildings surveyed and has asked for an appropriation to have them overhauled similarly. The Departments of Public Health and Charities of other cities have been waiting for the decision of the New York City authorities and will now undoubtedly proceed to have their buildings made safe likewise, so that there is little doubt that the example thus established will be followed generally in all institutions of this kind wherever located.

This work involves fire alarm signal systems covering some 200 buildings and, with the Department of Correction and Bellevue Hospital, half as many more. These will all be of special design, leaving out steam whistles and large gongs, which are suitable in some cases for factories, but entirely out of place for hospitals, where the inmates are invalids apt to be seriously affected by noise and excitement.

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# AUTOMATIC FIRE ALARMS

## REQUIREMENTS OF AN EFFICIENT SIGNALING SYSTEM

*By V. L. Benedict, Los Angeles, Cal.*

TO put out fire, it is but reasonable to make use of trained fire fighters maintained by the community, notifying them at the actual beginning of a fire by an automatic fire alarm.

Such an alarm should signal fire headquarters directly. It should operate only on a sudden rise in temperature and should be so sensitive that the firemen may put out the small fire with trifling loss.

The heat detector should be adjustable, since one part of a property may have but a small temperature variation while adjacent parts may have wide temperature variations, and the detector should conform to the local conditions. It should be unaffected by moisture, expansion and contraction, corrosion, dust, etc., and should be a permanent device, without springs or other parts subject to deterioration with age.

The fire signal should give the floor or section of the building, and at the front door should be indicating shutters to show the location of the fire or its progress from floor to floor. These shutters should be automatically illuminated for convenience at night fires.

Every foot of the entire automatic fire alarm system should be under continuous test, with a distinctive signal if any part is out of normal condition. A derangement in one floor of a building should not prevent a subsequent fire from instantly sending in a fire signal from the floor which is signalling "trouble." This is possible by using two local circuits, the

heat detector joining the two while opening one of them. This allows an open or crossed circuit to signal "trouble," but the fire alarm protection is unimpaired. If the detector should do no more than close a circuit an accidental short circuit would signal "fire" and an open circuit would prevent a signal from that floor.

The transmitting system should permit two simultaneous fire or trouble signals being received. Since a fire alarm must not be lost in transmission non-interference is of paramount importance. A ground or break in the line should not prevent signals being received, and automatically the operating company should be notified of the trouble. Only genuine fire signals should reach fire headquarters, whose operator should not have the burden of line troubles or local troubles in a building, since automatically signaling is still possible.

The automatic fire alarm system in a building may be entirely disabled only by grounding, cutting or short-circuiting both wires to that building. While an open or grounded circuit is easily noticed, a short circuit is more difficult to detect automatically and it cannot be automatically signaled through. Since a building must not be left for a moment without automatic protection this condition must be detected promptly. The automatic system should include a device to notify the occupants of a building when the automatic service is cut off.

As recommended for factories by Labor Commissioner Bryant of New Jersey, fire alarms should sound all over a building. This on the automatic system would immediately notify the heads of departments in just what part of the building the fire is, and the management can take steps to control the situation, prevent panics, and perhaps by immediate attention put out the small fire before arrival of the department forces.

An ideal automatic fire alarm system is of great aid to the fire department, lessening fire loss and risk of injury to firemen and apparatus. It does not require a high fixed temperature to operate it; therefore work is very much quicker than devices of such requirements. Water or chemicals are intelligently applied only as needed and water losses are minimized. A watchman, as well as manual signal systems, may be dispensed with, since an automatic system also should include manual boxes in case of fire in adjacent property.

To quickly detect a fire at its beginning, to telegraph fire headquarters where it is in a building, to obviate heavy water loss from accident or a small fire, to safeguard life by prompt and general local alarms, to provide actual and efficient fire protection, to give property owners, tenants, factory managements and operatives, fire insurance companies and fire departments a greater sense of security of life and property, is the province of the ideal automatic fire alarm.

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## LOSS DUE TO LARGE AREA.

Large areas often result not only in the total destruction of burning buildings, but in serious injuries and loss of life. A $130,000 fire in the warehouse of Barker Bros., Los Angeles, Cal., the result of which is shown, clearly demonstrated this fact. The fire was in the center of a large building and the fire department was seriously handicapped in its work because of the impossibility of getting at the flames due to large volumes of smoke. Five firemen were injured.

# CONFLAGRATION CITIES AND TOWNS, 1914

## In Which Occurred Fires That Destroyed Three Buildings or More

### ALABAMA.

Alabama City.
Berry.
Birmingham (3).
Dadeville.
Decatur.
Elamville.
Florala.
Florence (2).
Guntersville.
Huntsville (2).
Killen.
Lapine.
Louisville.
Lowe Village.
Montgomery (2).
Moundville.
Northport.
Red Bay (3).
Thorsbury.
Tuscaloosa (3).
Tuscumbia.

### ALASKA.

Flat City.

### ARIZONA.

Bisbee.
Globe.
Phoenix.

### ARKANSAS.

Arkadelphia.
Ashdown.
Black Rock.
Corning.
Dermott.
Erle.
Foreman.
Forrest City.
Fort Smith.
Harrison.
Hartford.
Hoxie.
Jonesboro.
Little Rock (4).
McGhee.
Monette.
Pineville.

### CALIFORNIA.

Alturas.
Boyes Springs.
Briceland.
Calexico.
Coalinga.
Notasulga.
Scott.
Spring Place.
Thomasville.
Resaca.
Uvalda.

### IDAHO.

Bovil.
Genesee (2).
Ilo.
Middleton.
Peck.
Rigby.

### ILLINOIS.

Ashley.
Bluff.
Cave in Rock.
Chicago (2).
Clinton.
Danville.
Deer Grove.
Dongola.
Easton.
Edinburg.
Fisher.
Manito.
Princeton.
Red Bud.
Rockford.
Virden.
Watertown.

### INDIANA.

Bedford (2).
Cedar Lake (2).
Columbus.
East Columbus.
Elwood.
Etna Green.
Evansville (2).
Freeland Park.
Indianapolis (5).
Jacksonville.
Jasonville.
Jasper.
Lake Winona.
Marion.
Michigantown.
Nappanee.
Ockley.
Portersville.
Russellville.
St. Joseph.
Terre Haute.
Sacramento.
Sebree (2).
Slaughtersville.
South Jackson.
Waddy.
West Mayfield.
Williamsburg.
Wingo.

### LOUISIANA.

Baton Rouge.
Bernice (2).
Bucktown.
Coushatta.
Dequincy.
Edgerly.
Fordoche.
Glenmora.
Jennings (2).
Lake Providence.
Mineburg.
Monroe (2).
New Orleans (2).
Oakdale.
Ringgold.
Ruston.
Shreveport (2).
Sicily Island.
Thibodaux.
Welsh.

### MAINE.

Benton Falls.
East Machias.
Ellsworth.
Frenchville.
Hodgdon Corners.
Lewiston.
Mount Vernon.
Portland (2).
Raymond.

### MARYLAND.

Alleghany Grove.
Baltimore.
Creagerstown.
Crisfield.
Elkton.
Hagerstown (2).
Mt. Airy.
Princess Anne.
Salisbury.

### MASSACHUSETTS.

Cliftondale.
Conomo Point.

### MISSISSIPPI.

Bay Springs.
Beloni.
Bond.
Charleston.
Clayton.
Clinton.
DeKalb.
Gulfport.
Houlka.
Logtown.
Paden.
Prentiss.
Sumrall.
Sunflower.
Union.
Utica.
Vicksburg.

### MISSOURI.

Aldrich.
Devier.
Caruthersville.
Dexter.
East St. Louis.
Eldon.
Elmer.
Flat River.
Gallatin (2).
Laddonia.
Maplewood.
Monticello.
Neck City.
Neelyville.
Raymondville.
St. Louis (4).
Sikeston.
Stella.

### MONTANA.

Jennings.
Polson.

### NEBRASKA.

Cambridge.
Dakota.
Dubois.
Fremont.
Guide Rock.
Hubbell.
Loomis.
Newman Grove.
Oconto.
Tilden.
Wymore.
Ridgeway Corners.
Santa Clara.
Schonarie.
Troy.
Waterport.
Watertown.
Wellsville.
Witherbee.

### NORTH CAROLINA.

Durham (3).
Elizabethtown.
Farmville.
Spruce.
Whiteville.
Winston-Salem.

### NORTH DAKOTA.

Ambrose.
Cogswell.
Durand.
Edmore.
Fairview.
Foxholm.
Kloten.
Lakota.
Larimore.
Milton.
New Rockford.
Rutland.
St. Thomas.
Shields.
Tagus.
Taylor.
Tower City.
Underwood.
White Earth.

### OHIO.

Agosta.
Cleveland (6).
Defiance.
De Graff.
Dillonvale.
Findlay.
Johnsville.
Latty.
Lebanon.
McConnellsville.
New Richmond.
Portsmouth.
Sidney.
Springfield.
Tiltonsville.
West Marietta.
New Oxford.
New Salem.
Newville.
New Tripoli.
North Versailles.
North York.
Pablo Beach.
Petrolia.
Philadelphia (4).
Pittsburgh (2).
Reading.
Shenandoah.
South Bethlehem.
Steelton.
Tyrone (2).
Uniontown.
Vanderbilt.
Waynesboro.
West Grove.
Woodland.

### RHODE ISLAND.

Pleasant View Beach.
Providence.
Rocky Point.
Warwick (2).
Wrentham.

### SOUTH CAROLINA.

Aiken.
Andrews.
Brookland (2).
Columbia.
Cope.
Johnston.
Saluda.

### SOUTH DAKOTA.

Bemis.
Bison.
Columbia.
Geddes.
Gilbert.
Oldham.
Peever.
Wasta.

### TENNESSEE.

Carthage.
Coalfield.
Erin.
Madisonville.
Medon.
Monteagle.
Nashville.
Parsons.
Pulaski.

### VIRGINIA.

Bondtown.
Culpeper.
Danville (2).
Fredericksburg.
Ocean View.
Petersburg.
Purcellville.
Rose Hill.
Whaleyville.
Windsor.

### WASHINGTON.

Adna.
Anacortes.
Blaine.
Centreville.
Centralia.
Irondale.
Kent.
Leavenworth.
Lebam (2).
La Crosse.
Lyle.
Mansfield (2).
Moclips.
Naches City.
Northport (2).
Othello.
Seattle.
Shelton (2).
South Prairie (2).
Stevenson.
Tacoma (2).
Wilson Creek.

### WEST VIRGINIA.

Buffalo.
Charleston.
Elizabeth.
Magnolia.
Martinsburg (2).
Moundsville.
Princeton.
Spencer.

### WISCONSIN.

Antigo.
Askeaton.
Blanchardville.
Cadott.
Clayton.
Clyman.
Cooperstown.
Eau Claire.
Elderon.
Emerald.
Hawthorne.
Hillsdale.
Lake Mill.

Copperopolis.
Fresno (2).
Hanford.
Kernville.
La Honda.
Lindsay.
Los Angeles (3).
Oakland (2).
Penryn.
Port Costa.
Requa.
Rocklin.
Ross (2).
Sacramento (2).
Salinas.
San Francisco (2).
Santa Rosa.
Sawtelle.
Sisson.
Watsonville.
Watts.

COLORADO.

Leadville.
Oak Creek.

CONNECTICUT.

Ansonia.
Hartford.
Litchfield.
Litchfield Center.
New Haven.

DELAWARE.

Framington.
Georgetown.
Greenwood.
Laurel.
Milford.
Rockessin.

FLORIDA.

Baldwin.
Capitola.
Fort Myers.
Lake Butler.
Oviedo.
St. Augustine (2).
Tampa.

GEORGIA.

Alston.
Astoria.
Atlanta (2).
Columbus.
Eastman.
Forest Valley.
Haddock.
Helena.
Iron City.
La Grange.
Midville.
Waldron.
Westphalia.

IOWA.

Charles City.
Colo.
Estherville.
Fairfield.
Harvey.
Hills.
Hinton.
Huntington.
Letts.
Lidderdale.
Lucas.
Mechanicsville.
Missouri Valley.
Mondamin.
Morning Sun.
Mount Pleasant.
Popejoy.
Rhodes.
Sanborn.
Sioux City.
Williams.
Yale.

KANSAS.

Atlanta.
Burrton.
Clay Center.
Eskridge.
Garden City.
Haviland.
Hunnewell.
Kansas City.
Oskaloosa.
Reamsville.
Shawnee.

KENTUCKY.

Blackford.
Campbellsville (2).
Carrollton.
Columbus.
Corinth.
Danville.
Ervine.
Ft. Thomas.
Grayson.
Harlan.
Hazard.
Henderson.
Hodgenville.
Irvington.
Lebanon.
La Center.
Little Rock.
Louisville (4).
Monticello.
Murray.
Paintsville.
Pittsburg.
East Boston.
East Weymouth.
Fall River (2).
Fitchburg.
Hamilton.
Haverhill.
Newton.
Pittsfield (2).
Rockland.
Randolph.
Sagamore.
St. Lawrence.
Salem (2).
Sharon.
Sherborn.
Somerville (3).
South Deerfield.
Springfield.
Squantum.
Sterling Junction.
Upton.
Worcester.

MICHIGAN.

Alfred.
Au Gres.
Augusta.
Bay City.
Brooklyn.
Deerfield.
Dollarville.
Durand.
Essex.
Flint.
Freeland.
Harriette.
Kalamazoo.
Lewiston.
Marion (2).
New Haven.
Ottawa Beach.
Owendale.
Petoskey.
Port Huron.
Powers.
Raber.
Scottville.
Trout Lake.
Vassar.

MINNESOTA.

Colquet.
Detroit.
Dawson.
Hibbing.
Le Suer Center.
Mesaba.
Minneapolis (6).
Pillager.
St. Paul (2).
Thief River Falls (2).
Tracy.

NEVADA.

Ely.
Fremont.
Tonopah.

NEW HAMPSHIRE.

Cherry Mountain.
Keene.
Massabesic Lake.
Pittsfield.
South Elliott.

NEW JERSEY.

Atlantic City.
Bayside.
Bridgeboro.
Burlington.
Elberon.
Elizabeth.
Jersey City.
Keansburg.
Manasquan.
Newton.
Paterson.
Riverton.
Union Hill (2).
Whitesville.

NEW MEXICO.

Deming.
Dexter.
Gallup.
Melrose.

NEW YORK.

Albany.
Albion.
Ardsley-on-the-Hudson.
Baldwinsville.
Binghamton.
Bristol Center
Brooklyn (4).
Caton.
Clevedale.
Cuylerville.
Dongan Hills, S. I.
Gloversville.
Harrisville (2).
Hume.
Lake Bomoseen.
Le Roy.
Lindenhurst, L. I.
Lockport.
New York (7).
Niagara Falls.
Norwich (2).
Palmyra.

OKLAHOMA.

Altus.
Blue.
Glencoe.
Guthrie.
Perry.
Weleetka.
Wood.

OREGON.

Baker.
Bandon.
Burns.
Carlton.
Greenhorn.
Klamath.
Mill City.
Portland (5).
The Dalles.
Wilsonville.

PENNSYLVANIA.

Altoona.
Annville.
Audubon.
Bellefonte.
Bentleyville.
Bethlehem.
Bryn Mawr.
Carbondale.
Carnegie.
Chester.
Cheswick.
Coatesville.
Copeburg.
Dallastown.
Dillsburg.
Duke Center.
Flemington.
Franklin.
Fredonia.
Girardville.
Glen Campbell.
Granger.
Irwin.
Kensington.
Lancaster.
Lebanon.
Lemoyne.
Lewiston.
Mahanoy City.
Manorville.
Marienville.
McKeesport (3).
McKees Rocks.
Meadowlands.
Mercer.
Mill City.
Millheim.
Monessen.
Montrose.
Mt. Carmel (2).
Mt. Joy.
New Castle.
Tiptonville.
Trenton.
Troy.
Waverly.
Westmoreland.
Yellow Creek.

TEXAS.

Alvord.
Appleby.
Aransas Pass
Big Spring.
Bridgeport.
Bronson (2).
Bullard.
Campbell.
Cement City.
Chireno.
Crosbyton.
Dallas (4).
Dickens.
Eastland.
Elkhart.
Fairgrounds.
Ferris.
Florence.
Fort Worth.
Gatesville.
Handley.
Hills.
Houston (2).
Joshut.
Laredo.
Longview.
Mabank (2).
Matagorda.
Mineral Wells.
Nederland.
Overton (2).
Palestine.
Paris.
Queen City.
Rugby.
San Antonio.
San Augustine.
Santo.
Sherman (3).
Talpa.
Tenaha.
Terrell.
Texas City.
Vashti.
Weatherford.
Winfield.
Winnsboro.

UTAH.

Carr Fork.

VERMONT.

Lyndonville.
Montpelier.
Sheffield.
Arlington.
Milwaukee (3).
Monroe.
Nadeau.
Oshkosh.
Prentice.
Rice Lake.
Ripon.
Solon Springs.
Superior.
Wabeno (2).
Weyauwega.
Wilkeson.
Winthrop Harbor.

WYOMING.

Superior.

CANADA.

Banff, Alta.
Bathurst, N. B. (2).
Bedford, Que.
Belleville, N. B.
Belleville, Ont.
Bow Island, Alta.
Brandon, Man.
Bryson, Que.
Carlstadt, Alta.
Chaplin, Sask.
Chilliwack, B. C.
Duart, Ont.
Dunrea, Man.
East Florenceville, N. B.
Filbury, Ont.
Fort George, B. C.
Fredericton, N. B.
Grimsby Beach, Ont.
Guelph, Ont.
Halifax, N. S.
Hamilton, Ont.
Hanna, Alta.
Hearst, Ont.
Hillaire, N. B.
Ingersoll, Ont.
Listowel, Ont.
Liverpool, N. S.
Montreal, Que. (7).
Okotoks, Alta.
Outremont, Ont.
Patrolea, Ont.
Peel, N. B.
Portage du Fort, Que.
Powassan, Ont.
Quebec, Que.
St. Stephen, N. B.
South Vancouver, B. C.
Stewart, B. C.
Sussex, N. B.
Telkwa, B. C.
Toronto, Ont.
Trenton, Ont.
Uhthoff, Ont.
Val Brilliant, Ont.
Windsor, Ont.
Woodpoint, N. B.

# FACTORY CONSTRUCTION IN LARGE CITIES

## "THE MODERN FACTORY IS THE OUTCOME OF A CAREFULLY STUDIED AND WORKED-OUT SCHEME"

*By Emile G. Perrot, M. Am. Soc. C. E.*

THE advance made in the construction of factory buildings during the past thirty years has been in keeping with the progress of civilization and with improvements tending to ameliorate the conditions of the working classes and to advance the cause of manufacturing. Even the casual observer can notice the strides made in the general appearance of factories.

The early construction of stone or brick buildings, with their massive walls, small windows and high pitched roofs, to this day remain as monuments to efforts of a bygone generation. These buildings, constructed by the local builder, were fashioned after the usual type of house construction; that is, joisted floors covered with the regulation flooring; the stairs were of the open interior type; the elevators, if there were any, were run in open wells; fire cut-offs between floors or large areas were not dreamed of; neither were any means provided to extinguish fires. With improvements in machinery and a demand for large floor space, as well as the advent of the specialist in mill construction, came the development of the so-called "slow-burning" or "mill" construction, fostered by the mutual fire insurance companies, whose campaign of education left its impress on factory building to such an extent that it revolutionized the construction of manufacturing plants. The modern factory is the outcome of a carefully studied and worked-out scheme along lines best suited to the needs of the industry.

### TRANSFORMATION IN PHILADELPHIA.

Back in the seventies, Philadelphia underwent a transformation along the lines above mentioned. Kensington, or the mill district, as it is called, was the scene of great activity in the construction of mills for all purposes. These were followed by the new type of slow-burning construction, consisting of plastered brick walls, with high windows, so spaced that a pier occurs every 8 ft., or possibly 10 ft., and the windows occupy one-half of this space, so that in general there occurs a 4-foot pier and a 4-foot window. The girders are usually spaced 8 ft. on centers and run across the building, being of heavy yellow pine; the interior of the floor being supported on yellow pine posts. Spanning from girder to girder, instead of joists on edge, sliptongued planks, 3 or 4 inches thick, are laid flat; on top of the planks a layer of building paper is often used before the finished layer of 5/4-inch tongued and grooved flooring boards are laid.

The wall bearings of the girders are made so that in case of fire the girder in falling will release itself and thus avoid throwing the wall. The post caps are of some form of iron so arranged that the load from the post above is transmitted to the post under it directly, the girder either being cut off and carried on the projecting brackets of the post cap, or else a cast-iron saddle or pintle is used, so that the girder can run through over the post, and the load from the post above be transmitted to the one below by means of the cast-iron saddle. The old method of using wooden bolster caps and making the wooden post rest on top of the girder is one of the worst features of the old factory construction, and is responsible for the unevenness of many old floors, not to mention the danger of collapse of a floor from having too many layers of timber on top of each other. As the principle of "slow-burning" construction, that is, the use of large size timbers located at distant intervals and the omission of concealed spaces in floors, roofs and partitions, became better understood, most factories and mills up to about eight years ago were built on this principle. In fact, in the present law of the State of Pennsylvania this construction occupies second place in the classification of buildings; the first class being fireproof construction.

### "SAFETY FIRST" FOR OCCUPANTS OF BUILDING.

In the matter of stairs and fire escapes, the principle followed in "slow-burning" construction is not to have any unprotected openings through floors or between major divisions of a building. Stairs and elevator shafts are required to be enclosed in brick walls, with the openings protected with tin-clad fire doors. Instead of the outside fire escape, which is nothing more or less than a human gridiron in case of fire, the fire escape is a full-fledged stairs enclosed in brick walls, access to the stairs being obtained indirectly by means of an outside fireproof balcony; the door from the building to be in the outside wall and a door leading from the balcony to the fire tower. This type of stair tower permits those in the building to proceed, in a fireproof shaft, from any floor to the ground without coming in contact with the fire or smoke.

An improvement over the outside balcony is the inside vestibule, an invention of a Philadelphia mill engineer, which requires the fire tower to project some 5 feet further into the building. The vestibule is located inside of the walls of the building, the front being entirely open, except for a balustrade or grille to protect those using the tower.

Another feature of the fire tower, which makes it superior to the outside fire escape, is that it is made to serve as stairs for every day use. The employes using it as means of entrance and exit, in case of panic they would instinctively run to the place they are accustomed to use daily, thus insuring their safe exit.

### REINFORCED CONCRETE.

In the matter of fire protection, the use of the automatic sprinkler, which opens in case of a fire near it, is one of the main features of a modern equipped plant, whether of "slow-burning" or of fireproof construction.

The greatest advance, however, in factory or mill building, in this city, took place about 12 years ago, with the introduction of reinforced concrete in the construction of a machine shop for Hugo Bilgram. Since that time numerous plants have been reared with floors and piers entirely of this material.

The first of these buildings bore the impress of the influence of the "slow-burning" construction in that the spacing of the beams and columns followed very much the lines of "slow-burning" construction. However, as the possibilities of reinforced concrete became apparent, and longer spans and fewer posts were found to be economical, the character of the exterior walls changed considerably, so that in place of the rows of windows and piers alternating with each other, we find the use of wall columns or piers of small dimension spaced as far as 16 ft. apart, or further, the intervening space being filled up entirely with windows. This permits of a maximum amount of light and a small percentage of wall surface, thus changing at once the character of the building.

The use of cement-finished floors in warehouses and buildings where wet work prevails makes it possible to obtain waterproof floors at much less expense than where "slow-burning" construction is used. This makes reinforced concrete more desirable than "slow-burning" construction.

Further, the quality of yellow pine, which forms the material out of which beams, girders and columns are made, has deteriorated so much in the last decade that it is impossible to get proper material in the large sizes. This has hampered the designer to such an extent that he has been obliged to look to another material which would lend itself to the needs of the various industries, and of steel and cement or brick construction, without impairing the quality of the building. Happily, this material has been found in reinforced concrete and the number of plans erected bears testimony to the superiority of this material for this type of building.

### SECURITY FOR HUMAN LIFE.

The security which one feels when in a fireproof building and the absolute safety from fire consuming the building rapidly, forms a safeguard against panics which result in loss of life due to fires. Much loss of life could be avoided if all buildings were built not only with safe and a sufficient number of exits, but of fireproof construction. The cry is often heard that there has been loss of life in

fireproof buildings and that the so-called fireproof building is a misnomer, reference being made to the Ash building in New York. This particular building, however, was lacking in proper fire escapes which should form a part of every well-planned factory, whether fireproof or not.

Too much emphasis cannot be placed upon the admirable laws of Pennsylvania governing cities of the first class, which require the brick-enclosed tower fire escape to be provided for all buildings where many persons congregate. If the Ash building had been constructed with fire towers and the occupants trained in fire drills I doubt if there would have been any loss of life whatever, unless it would be due to the stupidity of the occupants. In fact only recently several hundred children were saved from a burning building by being led to the ground through tower fire escapes.

In some industries it is necessary to have clean and sweet rooms, in which the products are manufactured. This can be easily obtained by the use of a cement finish on the concrete floor construction.

Where moving machinery, which causes excessive vibration and therefore hastens the deterioration of a building, is used, reinforced concrete, by reason of its monolithic character and stiffness, can be used to great advantage. The building of the Ketterlinus Lithographic & Manufacturing Company, Fourth and Arch streets, Philadelphia, is a noted example. This building contains large printing and lithographic presses, ranging from 12 to 20 tons, located on the second, third and fifth floors, the operation of which produces no ill effects whatever on the building, which was erected nine years ago.

### ORNAMENTAL EFFECTS ON CONCRETE.

When it is desired to give a building an ornamental character, concrete wall piers can be veneered with brick, stone or terra cotta, as is frequently done in the larger and more important buildings in the built-up sections of the city. Ornamental effects on reinforced concrete can be obtained by scrubbing the surface, causing the aggregate to show. This latter should consist of stones or pebbles of proper color so that the tone and texture of the wall will have a pleasing appearance. Further, the use of a pneumatic tool for picking the surface, after the forms are removed, thus presenting a tooled appearance to the concrete, forms one means of cheaply obtaining a good finish, without veneering the building.

Where wooden floors are desired on the interior of the building, they are formed by laying 2 x 3-in. sleepers every 16 inches on top of the rough concrete slab and filling in the space with cinder concrete, which acts as a means of holding the sleepers in position. These sleepers should have nails driven into the sides to act as anchors to the concrete fill. This concrete fill also provides a means of running electrical conduits and gas piping in the floors without having them exposed on the ceiling below. However, in factories it is customary to run conduits on the ceilings below, leaving holes through the beams and girders when the concrete is poured by introducing pieces of old pipe, which form sleeves for the conduits to pass through.

### SOCKETS FOR SHAFTING AND SPRINKLERS.

There should also be provided on the underside of beams and girders means for supporting shafting. This is accomplished by building in some form of socket, extending into the beams or girders, with arms projecting over the reinforcement so that they cannot be pulled out. These sockets are usually tapped for ¾ or ⅞-in. bolts and arranged in rows on the ceiling, spaced about 4 or 5 ft. apart in each direction. Where special loads are intended to be carried from the ceiling, it is necessary to provide, in advance, special anchors in the concrete, or drill through the concrete slab after the building is erected. When sprinklers are introduced the sockets for the hangers should be paced where the lines for piping are to be run. Some precaution should also be taken for steam mains and other piping, where the location is known in advance. However, should the location not be known in advance, the introducing of sockets as above mentioned offers a means of fastening the shafting, etc., at any point without cutting into the concrete.

As to finishing the surface of concrete on the inside of a building, it is not found necessary to plaster the concrete in factory buildings, as the use of plain boards in the form work, if properly made, will give a sufficiently smooth surface for whitewashing or for finishing with cold water paint. Of course, any parts that come out of the forms honeycombed can be smoothed over with liquid cement or cement plaster. Where offices occur, or where the rooms are to be finished smooth, a finish can be had by putting a plaster white coat directly on the concrete. This makes a hard, smooth white surface the same as in ordinary plastering.

In the construction of floors one is not confined to the beam and girder system of supporting the floors. The use of flat slabs, carried on columns only, affords a means of keeping the story heights, top to top, lower than is the case where beams are used, and gives a flat ceiling, should one be desired. However, experience has proven that the beam and slab system is cheaper to build, makes a stiffer building, and by the proper spacing of the beams the lighting is just as effective as any other system of construction.

### WIRE GLASS IN METAL FRAMES.

Where there is a fire hazard surrounding the building, the use of metal frames and wire glass in the openings, the same as would be used in "slow-burning" construction, is desirable. Where the windows are large and there is no particular hazard, a very effective window, made of rolled steel bars, can be substituted in place of the ordinary wooden sash. These windows are very economical in cost; in fact they are cheaper than wooden frames and sash in many cases. They possess, further, the advantage of not shrinking and giving trouble due to wind blowing through the crevices, which is one of the objectionable features of the ordinary wooden window frames and sash. Where it is necessary to have absolute protection from the outside, these iron frames can be stiffened at intervals with a vertical steel mullion and glazed with wire-glass. When so constructed, the building is practically immune from destruction by fire and the percentage of glass area is not cut down as would be the case were the regulation hollow sheet metal frames and sash used.

Much could be said concerning the design of reinforced concrete factories, as the material is one which lends itself to great flexibility of design and is applicable to the various industries; and the writer looks to the time when the "slow-burning" mill will be regarded with disfavor very much in the same manner as we look back at the old joisted and stone wall mill of the past.

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## EXTINGUISHING LIQUID FIRES.

According to Edward A. Barrier, the only principles which can be made use of in extinguishing fires in volatile oils are (1) to form a blanket of either gas or solid material over the burning liquid, which will cut it off from the oxygen of the air or, (2) to dilute the burning liquid with a non-inflammable extinguishing agent miscible with it.

In a paper presented to the American Society of Mechanical Engineers the above-named author said that sawdust is specially efficient in extinguishing liquid fires, as it forms a blanket which for a time floats upon the surface of the liquid, excluding the oxygen of the air. The efficiency of sawdust is greater on viscous then on thin liquids, as it floats more readily on the former than on the latter. The sawdust itself is not easily ignited and when it is it burns without a flame and the burning embers have not a sufficiently high temperature to reignite the liquid. Mixing sodium bicarbonate with the sawdust increases its efficiency materially.

Carbon tetrachloride has received recently considerable attention as a fire extinguishing agent. If pure, the water-white liquid has a rather agreeable odor not unlike that of chloroform; its specific gravity is 1.632 at the melting temperature of ice. It is non-inflammable, non-explosive and mixes readily with oils, waxes, japan, etc. The vapor is heavy, having about 5½ times the weight of air so that it forms a blanket of non-inflammable gas over the burning liquid which excludes the oxygen of the air necessary to the process of combustion.

# EXPLOSIVE HAZARDS IN MANUFACTURING PLANTS

*By J. Corbit Barden, Associate Director, Bureau of Inspection and Accident Prevention, Aetna Life Insurance Company.*

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A SERIOUS element of danger to employes in manufacturing plants is the manufacture or use of explosive substances, or substances giving off explosive vapors.

Any explosion in a manufacturing plant may cause injuries to employes by the direct force of the explosion or, as fire generally results from such explosion, by fire and panic.

As most of the States are adopting compensation laws and many policies are written without limits, the liability inspector must be trained to estimate the fire and explosive hazard in each plant inspected and must study to eliminate as far as possible such hazards.

Explosive chemicals, liquids or gases are used or generated to a greater or less extent in practically all lines of industry, but unless an inspector is familiar with all of the processes of the different lines of manufacturing, he is very likely to go through a plant in which some very hazardous operation is carried on without having his attention called to this dangerous operation, as they are often not apparent and can only be learned by inquiry.

The purpose of this article is to point out some of the dangerous processes used in some manufacturing plants, and also general explosive hazards which may be found in almost all plants.

## CHEMICALS, ACIDS AND ACID VAPORS.

The use of chemicals in large carboys is very common and in many plants these carboys are often received in one or more carload lots. Many injuries occur from the explosion of these carboys. These explosions do not seem to depend upon the nature of the acid, or the material of which the carboy is made, but provided the acid is sufficiently strong, they occur under all sorts of conditions.

The most commonly occurring acids and their trade names are as follows: Sulphuric Acid, also known as Oil of Vitriol; Hydrochloric Acid, also known as Muriatic Acid; Nitric Acid, also known as Aqua Fortis; Hydrofluoric Acid (in lead carboys).

The glass carboys (generally of 12 gallons capacity) are encased in a wooden box, the bottle being held in place and cushioned with hay or other material. The fragile nature of glass, the tendency of wood to rot and steel nails to corrode (particularly when near acid) together with the rough handling incident to railroad transportation render breakage of carboys no uncommon occurrence. Such breakage is sometimes of an almost explosive nature and there is always danger that more or less acid will spatter on the face, hands and body of the one handling it.

The following rules should be observed in the handling, storage and use of these acids:

1. On account of the liability of the glass bottle to crack, extremes or sudden changes of temperature should be avoided so far as possible; a frequent cause of chemical explosions is the liberation of vapors caused by storage in a warm room or in direct rays of the sun.

2. Carboys in storage should rest on wooden strips. In case of breakage the liberated acid will not then come in contact with the nails on the bottom of other carboys with resultant danger of bottom and bottle falling out when the package is removed for use.

3. If carboys are piled row upon row care should be taken that the bottoms of the upper row do not touch the glass necks of those below. If this is not observed the strain is liable to crack the glass bottles.

4. Nitric Acid should not be stored in a wooden building, or row upon row, as fire may be caused by acid escaping from breakage.

5. When a new shipment of carboys is received their stoppers should be

loosened, so as to relieve any internal pressure. If the bottles are too full about two quarts should be removed from each. This is especially necessary in hot weather.

6. Great care should be exercised in handling carboys so that they shall not fall and be broken, or their contents spilled while pouring. (See article which appeared in SAFETY ENGINEERING for June, 1913.)

7. Departments of factories where acid is stored or used should be kept clean and free from rubbish over which a man might trip, or slimy places on which he might slip while carrying or using acid.

8. Buckets of clean water should be so placed that they will be quickly and easily available for removing acid from hands, face or other parts of the workers.

9. Where gases having a poisonous, corrosive or anaesthetic action are present great care should be exercised in order that the operators shall not be overcome or injured. Goggles, respirators and safety helmets should be available. Certain of these dangerous gases are:

*Poisonous.*—Red gases from Nitric Acid. Chlorine.

*Corrosive.*—Muriatic Acid. Ammonia.

*Anaesthetic.*—Chloroform. Benzine.

Metal drums containing Sulphuric or Mixed Sulphuric and Nitric Acids should never be left open, as the acid at the top may become diluted from moisture absorbed from the air. Weak acid attacks the metal rapidly and may cause weakening or puncture of the container. Except when acid is being drawn the bung should always be in place.

Naked flames, lights or work of any sort which is liable to cause a spark should be avoided absolutely around tank cars, tanks, drums or any other metal container used for holding acid. The action on metal is apt to generate enough hydrogen to produce explosive mixtures.

Carboys and drums of acids are now used in so many different lines of industry that the liability inspector should make inquiries at every plant visited as to what chemicals or acids are used and how they are stored and handled.

EXPLOSIVE GASES AND VAPORS (GENERAL).

While carboys of chemicals frequently break or explode, the effect of such an accident is generally limited to a comparatively small area, and injury is seldom done to persons other than those near the carboy at the time of the explosion. This, however, is not true of the explosion of gases or vapors. When such vapors are given off in any process of manufacture, they spread out, mixing with the air throughout the entire room, and also passing through floor or wall openings into other floors and rooms. Explosions are often caused by these vapors reaching open fires or lights in places quite removed from the source of the vapors; and when such an explosion occurs, it generally takes place over a large area in the form of one quick flash with intense heat, killing or injuring, in many cases, all persons within a wide area.

The most dangerous gases or vapors are those from *gasolene, benzine, benzol, naphtha, acetylene, ethylene, ether, alcohol, hydrogen, chloroform, amyl acetate,* and many others of similar nature.

*Note*: Oxygen, chlorine and ammonia while not being explosive are dangerous to life.

Some general rules for safety should be observed wherever any of these gases or vapors are used or generated in the process of manufacturing. A few of these rules are as follows:

1. All rooms where explosive gases or vapors are used, or generated, should be tightly enclosed and isolated from the rest of the plant.

2. A proper system of ventilation, including hoods and suction fans, should be used. Care should be taken to see if hoods and fans are properly arranged, due consideration being given to whether the gas or vapor in the room is heavier or lighter than air. If the vapor is lighter than air, hoods and vents without suction fans may be sufficient, but if it is heavier than air a suction fan should always be used.

The following table lists some of the most common gases and vapors, showing whether they are heavier or lighter than air:

| *Lighter than Air.* | *Heavier than Air.* |
|---|---|
| Acetylene | Oxygen |
| Carbon monoxide | Alcohol |
| Ammonia | Sulphur |
| Hydrogen | Chlorine |
| | Ether |
| | Naphtha |
| | Gasolene |
| | Benzine |
| | Benzol |
| | Chloroform |
| | Amyl acetate |

3. All joints in tanks, pipes, conveyors, valves, connections, etc., should be kept tight so that no gas or vapor can leak out into the room. Sufficient time should be given to allow all gas to escape from vessels, pipes, etc., before work of any kind is done on them. Special care must be taken before soldering, or any other work requiring the use of a flame, is done around such apparatus. The gas or vapor should be displaced from vessels, pipes, etc., by a current of air. If the apparatus has contained acetylene, it should be submerged and filled with water to force out the gas before work is begun.

4. No open light, or flame of any kind, nor any machine or belt capable of producing a spark of any kind, should be allowed in the room. (All shafting and machines with belts liable to cause a static electric spark should be well grounded.) Only incandescent electric lights should be used and these should be of the double-globe, vaporproof, keyless type. All switches, fuses, etc., should be outside of the room.

5. Danger signs should be posted on all doors opening into the room, and these signs should warn against the carrying of open lights of any kind into the room.

GASOLENE, BENZINE, NAPHTHA, ETC.

Vapors from gasolene, naphtha, benzine, etc., are the cause of frequent explosions (vapor from one pint of gasoline will make 200 cubic feet of air explosive), and as these substances are now used for so many different purposes and to such a wide extent, the inspector should, when making an inspection, be constantly on the watch for signs of their use and note what precautions are taken against explosion.

Where large amounts of these substances are used, the main supply should be stored in a metal tank buried at least two feet underground and at least thirty feet from the buildings, and the working supply should be pumped into the buildings as needed. The system should be so arranged that when the pump is stopped all the liquid in the pipes will flow back into the supply tank. When it is not practical to use a buried tank and pump, the main supply should be stored outside, and well away from other buildings, under lock and key. Working supplies should be taken into buildings only in closed metal cans of not over ten gallons capacity and should be used, wherever possible, only from safety cans. Safety cans should also be in use, wherever possible, if the supply is pumped into the building.

Where the use of open pans is necessary, the opening should be as small as possible and a cover should be provided.

Signs should be posted prohibiting the bringing of an open flame near the place of storage or near a pump or other handling apparatus.

These signs should also tell the danger involved and give instructions as to safe methods of working.

Empty gasolene barrels should be stored, with bung holes down, in safe places in the open air.

One of the most dangerous uses of naphtha, etc., is in the different naphtha extracting processes. These processes consist in extracting grease, oils, etc., from other substances and then distilling off the naphtha by heating in closed vessels, the naphtha vapors passing off through pipes to a condenser, where they are condensed back into a liquid which can be used over again.

Cold liquor *must not* be admitted into hot or warm stills. Get the still cold first.

Any leaks in vessels, pipes, valves or fittings will allow the dangerous vapor to escape, and if this comes in contact with an open flame or a spark of any kind an explosion will result.

Rubber piping must never be used for benzine or solutions containing same, as

benzine will corrode the rubber and cause leaks.

The different naphtha extracting processes found in the various plants may vary somewhat from the one described above, but the hazards are practically the same and can be guarded against to a great extent as explained under "Explosive Gases and Vapors."

### ACETYLENE LIGHTING SYSTEMS.

Acetylene gas is now being used quite extensively for lighting in isolated plants. The principal dangers in connection with these lighting systems are the storage of the calcium carbide and the location of the generating apparatus. The liability inspector should note if the following precautions are observed.

(1) Calcium carbide should be kept in water-tight metal cans, by itself, outside of main buildings, under lock and key, and where it is not exposed to the weather.

(2) Rules should be posted prohibiting, (a) The charging of the apparatus except during daylight hours. (b) The depositing of residue or exhausted material from waterfeed machines in sewer pipes or near inflammable material. (c) Testing of generator or piping for leaks with a flame, or allowing lighted match, lamp, candle, lantern or any open light near the machine.

### GASOLENE VAPOR LAMPS AND LIGHTING SYSTEMS.

Gasolene vapor lighting systems are divided by the National Board of Fire Underwriters into five classes as follows:

Class A: Machines having outside carbureters.

Class B: Machines having inside carbureters.

Class C: Systems having outside tanks and inside flame-heated generators.

Class D: Gasoline vapor lamps.

Class E: Systems having inside tanks and inside flame generators.

These classes are arranged according to the hazard; the least hazardous being the one listed as Class A.

Inside tanks should never have a larger capacity than six gallons.

If an outside supply tank is used it should be buried at least thirty feet from buildings with all pipes so arranged as to drain back to supply-tank.

All pipe connections, joints, valves, fittings, etc., should be frequently inspected for leaks.

All systems should be installed in accordance with the rules laid down by the National Fire Protection Association.

### BLAUGAS GAS LIGHTING SYSTEM.

This is a comparatively new system of gas lighting in isolated sections. Blaugas is generated from oil and compressed to a liquid. This liquid is placed in cylinders. These cylinders are tested to 6,000 pounds, and there is little danger in the handling of these cylinders, which are shipped full to any address and returned when empty for refilling. Two of these cylinders are placed in a metal box outside of the building to be lighted and the gas is expanded into the building through suitable reducing and regulating valves. The hazard inside of the building is no greater than that of ordinary lighting gas.

### PINTSCH GAS LIGHTING SYSTEM.

This system is very similar to the Blaugas gas system, but is seldom used except for the lighting of railroad coaches.

### DUST EXPLOSIONS.

A great number of substances will explode if they are in a finely divided state and are mixed with air. These explosions are generally of a violent nature and may be caused by a flame or spark of any kind.

Some of the substances in which such explosions have occurred are:

| | |
|---|---|
| Coal | Malt |
| Lampblack | Flour |
| Tow | Celluloid |
| Wooddust | Sugar |
| Cork | Grains |
| Sulphur | Dextrin |

Where finely divided dust of any of these substances is formed to much extent in manufacturing processes, the same precautions should be followed as where explosive vapors are formed. (See "Explosive Gases and Vapors.")

All dust bins in flour mills, etc., should be vented to the outside of the building.

Ventilating systems should be installed wherever any quantities of dust are formed.

EXPLOSIVE SUBSTANCES.

The following is a list of some dangerous explosive substances which are frequently found in manufacturing plants:

| | |
|---|---|
| Celluloid | Gunpowder |
| Chlorates | Nitrogen chloride |
| Collodion | Nitroglycerine |
| Dynamite | Picrates |
| Guncotton | Picric acids |

*Celluloid* will explode from percussion, and the dust from celluloid will explode from a very small spark of any kind.

*Chlorates* are explosive from slight friction, shocks or when crushed.

*Collodion* is explosive from heat or shock.

*Dynamite* is explosive from heat or shock.

*Guncotton* is explosive when suddenly warmed, or from pressure, shock or friction.

*Gunpowder* is explosive from shock, pressure, friction or heat.

*Nitrogen Chloride* will explode under slightest provocation—sunlight or violent sound waves.

*Nitroglycerine* is explosive from heat or shock.

*Picrates* are explosive from heat, friction or shock.

LIQUIDS WHICH MAY CAUSE EXPLOSIONS UNDER RIGHT CONDITIONS.

| | |
|---|---|
| Carbon disulphide | Lacquers |
| Ether | Varnishes |
| Acetone | Benzol |
| Alcohol | Petroleum |
| Spirits | Illuminating oils |

Where any of these substances are found when making an inspection, the inspector should fully describe in his report, where and how they are stored, and used, and the average amount in storage and in process. If any process is used for recovering lacquers, etc., from fumes, or gases, note carefully and describe fully the method used as *such processes are exceedingly hazardous.*

BLASTING MATERIALS.

The question of handling, storage and use of blasting materials is such a broad subject that it can only be touched upon in this article. In general, however:

(a) All blasting materials should be stored in a separate well-detached, locked building with danger signs conspicuously posted on outside of same.

(b) No sharp or hard instruments or tools of any kind should be brought in contact with blasting materials.

(c) Blasting materials should never be subjected to shock, hammering or friction.

(d) Softening or warming should never be done by direct heat.

LIQUEFIED GASES.

Highly compressed or liquefied gases are now used in nearly all large laboratories and chemical and pharmaceutical works. The most common are

| | |
|---|---|
| Air | Ammonia |
| Hydrogen | Acetylene |
| Carbonic Acid | Sulphuretted Hydrogen |
| Sulphurous Acid | |
| Oxygen | |

These gases should never be allowed in rooms containing inflammable materials or other explosives.

They should always be kept in a cool place.

*Liquid Acetylene.* Note.—Acetylene gas may be compressed until liquefied and the liquid thus formed is a *very violent explosive.* The use of liquid acetylene is not permitted under any conditions by the fire underwriters, and is prohibited by law in many places.

In the preceding paragraphs of this article the more general explosive hazards have been considered together with rules for avoiding accidents from such sources. The application of these and other hazards to certain industries will be taken up.

The following list of classifications is only partial and only the more common explosive hazards are pointed out in each classification. The inspector should familiarize himself with this list and be constantly on the lookout for similar or special explosive hazards in all plants inspected.

## BLEACH, DYE, PRINT AND FINISHING WORKS OR DEPARTMENTS OF TEXTILE MILLS.

### BLEACHING CHEMICALS.

*Sodium Peroxide* readily gives off oxygen, and in contact with resin, ethereal oils, or mineral oils, or in a room containing inflammable gases or vapors, may easily cause a fire, or, under right conditions, an explosion.

*Chlorates* are liable to liberate oxygen explosively if mixed with potassium cyanide or sulphur, or under the influence of friction, shock, concussion, or of heat.

Chlorates are used especially where aniline black dyeing is done, and also for other oxidizing purposes.

### BREWERIES.

Dust explosions occasionally occur in the cleaning and separating room, and in malt-grinding mills. These explosions are generally caused by some foreign substance (such as a nail, etc.) in the grain striking a spark on the metallic part of the machine. To prevent these explosions, all grain should be passed over magnets before going to grinders or mills.

As far as possible, all dust should be collected into tight bins with vents to the outside. The entire plant should be frequently cleaned.

It should be noted whether pressure cookers (for rice and cereals) have proper reducing valve, safety valves, gauges, traps and drains. A considerable number of men have been injured by explosions which occurred while varnishing inside of the large vats. No open lights of any kind should be used in these vats. The insulation of any drop cords should be carefully looked over to see if they are in good condition. Lamp globes should be provided with metal guards.

Inspectors should note where and how much varnish, shellac, etc., is stored; also how much gasolene is used and where stored, especially when gasolene is used for branding.

Safety helmets are desirable in ice machine rooms for use in case of the breaking of an ammonia pipe.

### CANDY FACTORIES.

Note whether steam kettles are provided with proper reducing safety valves and drains.

Dust in starch buck, and shifting and drying rooms creates an explosive hazard, and special care should be taken to eliminate this dust as far as this is possible.

Note where and how much shellac and alcohol are used and stored.

### CLOTHING FACTORIES.

Note whether gasolene gas system is used for heating irons and if so, whether it is well arranged.

Note amount of benzine used for cleaning, and whether it is used from safety cans; also where main supply is stored.

### COTTON MILLS.

Pickers and openers should be provided with metal-lined gauze rooms.

Slashers should be provided with reducing valve; also with safety valve and gauges.

### COTTONSEED OIL MILLS.

Linter rooms should be cut off from the rest of the mill.

Dust and lint should not be allowed to accumulate in these rooms.

Material should be passed over magnets before going to linters.

### CORDAGE AND TWINE WORKS.

The dust and oily flyings create an explosive hazard and care should be taken to keep this dust down to a minimum.

Note where tarring is done and where main supply of tar is kept.

Explosions and fires in these risks are especially hazardous on account of the large volume of smoke which always accompanies them and renders rescue difficult.

### DRUG HOUSES.

Inspectors should note carefully to see what dangerous materials (such as noted previously) are handled, and in what quantities; also what care is taken to prevent explosions.

### FERTILIZER WORKS.

If cooking is done in closed steam kettles, a reducing valve, safety valve,

gauge and proper drain should be provided for each kettle.

FLOUR AND CEREAL MILLS.

Dust explosions frequently happen in these mills. Great care should be taken to eliminate as far as possible all dust from the workroom.

Cleaning machines should be provided with dust collectors, discharging to tight receiving bins with vents to the outside. Where any considerable amount of dust is necessary the precaution should be taken as noted under heading: "Dust Explosions."

Sulphur is frequently found in large quantities in these mills, and the inspector should note where and how much of this is stored.

GARAGES.

Note where and how much gasolene is stored and how it is brought into the building. Note whether gasolene used for cleaning is kept in safety cans.

Note whether automobile tanks are filled inside or outside of the building.

Note whether smoking is strictly prohibited.

Note where and how much calcium carbide is stored.

Note where and what quantity of Prest-O-Lite tanks are stored.

GLASS WORKS.

Note arrangement of fuel oil heating system.

Note whether there is a pit under all tank furnaces sufficient to hold a maximum amount of melted glass, in case bottom of furnace should fall out.

GLUCOSE AND STARCH WORKS.

Dust explosions frequently occur in starch grinding rooms and in dry rooms. Dust should never be allowed to collect in any quantity and rules as given under "Dust Explosions" should be observed.

Note the amount of sulphur on hand and where stored; also location and arrangement of sulphur burners.

Note quantity and method of storage of nitric acid used in converting processes.

GRAIN ELEVATORS.

Frequent disastrous explosions occur in grain elevators. Scrupulous cleanliness and all possible means should be taken to avoid accumulation of dust. Such dust may be exploded from hot bearings, open lights, static electric spark or any other form of fire. (See rules under "Dust Explosions.")

Note the amount of sulphur on hand and where stored. Also location and arrangement of any sulphur burners.

Considerable quantities of carbon bisulphite and other volatile and inflammable materials used for killing insects are sometimes found in grain elevators. Hydrocyanic acid gas is also used. Wherever any of these are found, the inspector should note the quantity and care used in handling.

METAL WORKERS.

*Oils.* Note storage and quantities of oils used, especially any volatile oils.

If any fuel oil system is used note the location and arrangement of tank. Supply tank should be buried at least thirty feet from the building, and should be so arranged that when the system is not in operation all oil will flow back to the tank.

*Acids.* If any acids are used, note quantity and whether they are stored and cared for as noted previously.

*Japanning.* If any japanning or lacquering is done the room in which the process is carried on should be cut off and arranged as noted under "Explosive Vapors."

*Gas Heated Japan Ovens* should have vent to the outside. Where this precaution has not been taken several disastrous explosions have occurred where gas has been, by some accident, left turned on to the oven without being lighted, the explosions occurring when light was being applied.

*Dip Tanks* used for dipping, containing any volatile oils, should be arranged with automatic covers and with an overflow pipe extending outside of the building.

OIL CLOTH AND LINOLEUM PLANTS.

An explosive hazard exists in the cork grinding room if dust is allowed to accumulate.

Linseed oil boiling should be done in a separate detached building.

Inspectors should note where the compound mixing is done, and whether precautions are taken as noted under "Explosive Vapors."

All machines in coating-room, especially the knives on coating machines and all shelves and racks (if of iron) in dry-room should be grounded to prevent a static electric spark.

All precautions, as noted under "Explosive Vapors," should be taken in every room where coating or drying is done.

PACKING HOUSES.

Fires occurring in these plants spread very rapidly on account of the grease and oil, and special precaution should be taken against fire and special attention paid by the inspector as to the cleanliness of these plants.

PATENT LEATHER AND ENAMEL LEATHER WORKS.

Daubs, japan and varnish should be prepared in separate detached buildings with all precautions (as noted under "Explosive Vapors") taken to prevent explosions.

Note where and in what quantities oils, lamp black, etc., are stored.

Note precautions taken to prevent explosions in boiling room, also the method of firing and the handling.

Note the amount of daub in coating-room, how the daub is handled, and what precautions are taken to prevent explosions in this room.

There is a large amount of naphtha used in these works. Inspectors should give details as to where and how it is stored, and in what quantities.

Direct heat and open flame of any kind should never be used or allowed where coating or mixing is done or applied.

PRINTING, BINDING AND LITHOGRAPHING.

Note kind of gas used on linotype machines. If gasolene gas is used, note arrangement of gas generating apparatus.

Note the amount of collodion in photo department, and care taken in handling same.

Note where main supply of benzine, used for type cleaning, is kept, and whether it is used from safety cans.

PULP MILLS.

*Sulphur Process.* Note where and in what quantities sulphur is stored, and arrangement of sulphur burners.

Give number and location of digesters, and state particularly whether they are insured by a boiler inspection company.

RICE MILLS.

The dust hazard exists in rice mills, and should be treated as explained under "Flour Mills."

Sparks are especially dangerous at the attrition machines.

RUBBER MILLS.

Where old stock is worked over it should be passed over magnets to remove metal particles.

Note where lamp black and oxides, etc., used for compounding, are stored and what care is taken to prevent explosions.

Note particularly whether churning-rooms are properly ventilated and cut off and whether machines are grounded to prevent static sparks.

Naphtha is used in large quantities and inspectors should note quantity in the building (especially in the churn-room) and how this is handled, and where stored.

Note where varnish is mixed, where stored and where used.

Note number of spreaders and whether machines are properly grounded to prevent static sparks.

SHIRT, COLLAR AND CUFF FACTORIES, AND STEAM LAUNDRIES.

Note whether gasolene gas system is used for heating irons and if so, the arrangement of same.

SHOE FACTORIES.

Note where and what amount of rubber cement is stored and if it is used from safety cans.

Note whether any waterproofing of shoes is done, and if so, whether compound used is stored and handled similar to naphtha or gasolene.

STRAW AND FELT HAT FACTORIES.

Note whether gasolene gas systems are used, and if so, whether they are properly arranged.

Considerable sulphur is often used for bleaching. Note where this is stored and how much is obtained at one time.

Note whether any sodium peroxide is used and if so, in what quantities.

SUGAR REFINERIES.

The dust hazard occurs in these plants, if the dust is allowed to accumulate to any extent, and on this account the works should be kept as clean as possible and free from floating dust.

Vacuum boiling kettles should be provided with proper safety valves and gauges.

TANNERIES.

A dust hazard occurs in bark mill rooms unless arrangement is made for keeping dust down to a minimum.

Note whether any naphtha decreasing process is carried on and if so, where and what precautions are taken against explosions.

WOODWORKERS.

If considerable sandpapering is done, particularly in cigar-box and other similar factories, there is a considerable dust explosion hazard unless special precautions are taken to keep this dust down to a minimum.

If varnish dip tanks are used they should be arranged with automatic covers and with overflow to outside of the building.

Note where, and in what quantities, oils, varnishes, naphtha, etc., are stored, and how handled.

# MONTREAL CHURCH AFTER A CHRISTMAS FIRE

Photo by Underwood & Underwood.

**The West End Methodist Church at Montreal, Que., was destroyed on December 25, 1914, when a fire swept the interior of the structure, causing damage amounting to $45,000. As the temperature was 18 below zero, the water applied by the fire department froze almost immediately. According to Safety Engineering's records 170 churches were destroyed or damaged by fire during the year 1914, the greater number of fires taking place during the winter months. This indicates that the inferior heating systems used in many churches are among the principal causes of fires of this class.**

# EDITORIAL

INDUSTRIAL safety has received, possibly, more attention throughout this country during the past two or three years than has any other subject related to industries. In our devotion to it, we may have overlooked the fact that there are other hazards connected with modern civilization which should be dealt with as we are now dealing with industrial hazards; that is, on a constructive rather than on a destructive basis. The subway accident in New York, early in January—caused by a short circuit in one of the manholes or splicing chambers—gave us a somewhat rude awakening to the presence of the dangers. As in the case of the Titanic disaster, and as has been the case after every real or near disaster, some of the daily newspapers immediately grasped the misfortune of the corporation involved to fasten personal guilt upon certain individuals of the management. Such a procedure is not alone contemptible; it is a positive public menace. It causes fear in the minds of the general public. The continual "headlining" of the subject, holding up the management of the corporation as "he-devils" who care not how many lives are jeopardized, produces an effect upon the public mind which, whenever a minor accident occurs, is sure to create panics which may have and often do have, far worse results than the accident itself.

SAFETY ENGINEERING holds no brief for the Interborough Rapid Transit Company, nor for any other public service corporation, but it has no hesitancy in stating—and this with a knowledge of the facts involved—that as respects the absence of accidents the history of the Interborough Rapid Transit Company's system is unique. When one realizes that between 1,000,000,000 and 2,000,000,000 passengers have been carried by the subway since its construction and that only one passenger has been killed in that period due to the operation of the subway, one may well be excused for complimenting the corporation on its efficient management rather than offering denunciation. At the same time we do not hesitate to take issue with the management when in our opinion its statements are wrong.

We do not agree with Mr. Hedley when he is reported as saying that short circuits of the kind that produced this accident cannot be prevented. We believe they can be prevented, and NOW is the accepted time to put forth efforts to devise means whereby they may be prevented in the future. Failing in this, at least the serious effects from such short circuits may be prevented. Our investigation, as so far conducted, has brought out certain facts which, if given attention, will go far to reduce the effects of such short circuits if they do occur. First, complete isolation of manholes or splicing chambers from the subway proper. Second, ample fire escapes properly indicated at short intervals between stations. Third, standpipes for hose connections and (or) automatic sprinklers. Fourth, direct fire alarm to fire department headquarters. Fifth, abolition of all combustible material from the subway including, of course, wooden and composition cars as rapidly as possible. Sixth, an independent system of lighting which may be applied when power circuit gives out; darkness, naturally, induces and increases the fear of the pas-

sengers. And last, but by no means least, proper instruction of guards as to what to do and what not to do in case of accidents and panics. It was evident in the recent disaster, that had the guards been properly trained in handling crowds in times of panic, all the people might easily have been brought to the surface without anyone being suffocated. Safety committees on a plan similar to those now organized in all large industrial establishments, with proper instructions to the guards what to do under given conditions, would, we are sure, not only benefit and safeguard the public but would be of the greatest benefit to the Interborough Rapid Transit Company itself and, in a large measure, would add to the efficiency of its employes.

Most of the foregoing suggestions are, of course, palliative. The crux of the question reverts to a non-combustible insulation for high tension conductors. To our knowledge, no such insulation is at present available. But it would seem that a fertile field presents itself to chemists to experiment for the production of such a material. The statement "It can't be done" is out of place where so much is involved.

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A SAFETY code for the manufacture as well as for the use and care of abrasive wheels and the parts of grinding machines related thereto has been agreed upon by the manufacturers of such machinery. The new code has received the approval of the National Machine Tool Builders' Association and the approval of other associations may be expected.

SAFETY ENGINEERING is especially pleased to publish the news of the preparation and adoption of this code. This magazine took the position in May, 1914, that it is the duty of manufacturers of machinery, ordinarily hazardous to workmen, to equip their machines with safeguards before they leave the factory; that manufacturers of machines, which, when not properly guarded, present hazards to operators, should consider the safety of the operators; that the guarding of a machine can be accomplished more satisfactorily when it is being built than when it has been completed and set up in the premises of a purchaser; that buyers of machinery when ordering new machines, should insist that the machines be fully guarded; that purchasers of machinery should be relieved of the relatively heavy expense of constructing guards after machines have been installed; that manufacturers of machinery should supply fully guarded machines, charging a fair price, if necessary, for the addition of safety features.

The action by the makers of abrasive wheels is in accord with this platform. They have taken a progressive step which will have the effect, in due season, of reducing the accident ratio. Insurance companies that write workmen's compensation insurance and departments of States which draw up laws pertaining to industries will find much in the new code by which they may be guided.

It is well for business men, in any line, to be the foremost students of every important phase of their particular business. Wisely, the manufacturers of abrasive wheels have given thoughtful attention to the safety phase of their industry. No doubt they will go further and submit their products to the Underwriters' Laboratories for the inspection and the approval which will secure the label issued by that body for safety.

# *Trachoma: Handling an Outbreak of the Dreaded Eye-Disease*

By James M. Woltz, Safety Director, Youngstown Sheet & Tube Company

*Mr. Woltz's story of the campaign conducted by the Youngstown Sheet & Tube Company to check the spread of trachoma in East Youngstown, Ohio, shows that a service to the community and a humane business policy on the part of a big corporation may go hand in hand—and they often do. On the initiative of the Youngstown company organized work on a large scale was undertaken to prevent a possible epidemic of trachoma. In its efforts to interest the public officials, whose duty it is to look after matters of health and sanitation, in the situation in East Youngstown, the steel company met with discouragements, but it was not discouraged. In the end it won against official red tape and circumlocution. As a consequence, many cases of trachoma were treated successfully and blindness and suffering prevented. "If this paper shall cause a single person to turn his attention to remedying conditions that are a crying shame—to American health authorities and physicians in particular—I shall feel amply repaid for the work required to prepare it," Mr. Woltz says at the conclusion of his article.*

IN this article, giving in detail our experiences in the handling of an outbreak of trachoma, it is the desire of the author to show other employers that they may be unsuspectingly harboring similar conditions. It is also the purpose to show how the Youngstown Sheet & Tube Company, of Youngstown, Ohio, willingly assumed a burden that properly belonged to the local or the State health authorities.

Trachoma is a disease of the eye that had its origin so far in the early history of the world that no one can tell definitely its beginning. Certain it is that it existed in its worst form in ancient Egypt. The medical writers of all ages mention its existence. Most of the eminent eye specialists of today agree that it is still a widely prevalent source. We of the United States know very little of the frightful results to those who are unfortunate enough to contract it.

Physicians disagree as to its diagnosis, and it is even contended by eminent authorities that no such disease is known now. These men refer to real trachoma, "Egyptian ophthalmia." Medical knowledge of many diseases is not definite, yet the treatment and cure or eradication of most diseases is fairly well established. The real cause of trachoma is not definitely known. There are times when the eyes of a patient may give rise to the suspicion that he is affected with trachoma. Treatment upon specific lines will soon develop these cases, so that a correct diagnosis can be made.

It is generally admitted that trachoma is an infectious disease, that it runs a certain course, that it is capable of being cured. Under some conditions only an operation can bring relief. Blindness is estimated to occur in about 75 per cent of untreated cases, and even where treatments are given, if not taken at an early stage, there is usually an impairment of the sight.

Courtesy of The Youngstown Sheet & Tube Company.

**A typical case of trachoma which was treated at the Youngstown company's hospital.**

FEDERAL GOVERNMENT'S REPORTS ON TRACHOMA.

A number of surveys have been made by the experts of the United States Public Health Service in various sections of the country. Reports by the Federal Government say that in certain mountainous districts in Kentucky, West Virginia, Tennessee, Georgia and the Carolinas, about 18 per cent. of the white population have well-defined cases of trachoma. Indians are also seriously infected with this disease; a survey of Minnesota shows that some of the tribes in that State have 22.46 per cent of the tribe infected.

Public schools and various institutions have been found to have many pupils with trachoma, particularly in the mountainous districts, where a large body of foreign laborers are grouped, and among the Indians. In some cases the infection reported by the Public Health Service in Indian schools is 39.29 per cent of those in attendance.

In 1897 the Secretary of the Treasury declared trachoma to be a dangerous infectious disease, and ordered all arriving aliens so afflicted to be deported.

TRACHOMA CASES IN EAST YOUNGSTOWN.

Trachoma was not a new or unheard-of disease in Youngstown, Ohio, prior to the fall of 1913, but there had been no serious outbreak of the disease and it was thought there were not a great many cases in the community.

Sometime in September, 1913, one of the reports from the emergency hospital of the East Youngstown works of the Youngstown Sheet & Tube Company showed that trachoma had been found in a patient who came into the hospital. After about two weeks two more cases of trachoma were reported. Examination of the living conditions of the patients disclosed so serious a menace to the health of the entire body of our employes that leaflets were prepared and printed in English and several foreign languages, calling attention to the disease, and the way to prevent its spread. The leaflets were distributed widely to give as much publicity as possible to the dangers.

OFFICIAL RED TAPE AND CIRCUMLOCUTION.

We made a careful survey of our mills and we felt that the cases in our

works had been contracted outside the plant, and that we were not in duty bound to care for the trachoma patients. We believed that this was a matter for the Township Trustees. (In Ohio the trustees of a township are the Township Health Board.)

Finding it useless to expect help from the local authorities, the officials of the Youngstown Sheet & Tube Company decided to ask the State to relieve us of a burden that did not belong to the company. A letter was sent to the secretary of the Ohio State Board of Health, asking him to detail his experts to visit East Youngstown and determine the action to be taken. In response the State Board detailed Dr. Bondreau and Dr. Hayhurst, who visited East Youngstown, examined the cases we had under treatment, and saw other cases.

### YOUNGSTOWN COMPANY'S APPEAL TO THE FEDERAL AUTHORITIES.

The men who presented the worst features of the disease were gathered into the village jail, confined for several days and given treatment by a local physician who had no knowledge of trachoma or its proper treatment. The next thing we knew these men had been released, no records were made of the cases, and no further effort was made to treat or care for them or the other cases that might develop.

Still interested in our employes and in the health of the village, we decided as a last resort to ask the United States Public Health Service to make a survey, and take action to control the disease. One of the company officials was sent to New York to interview the immigrant authorities and see what action could be taken looking to the deportation of persons infected, who had been in the country only a short time.

### FEDERAL BOARD ACTS AT REQUEST OF STATE BOARD.

Our representative was given every facility in New York by the Federal authorities. They suggested that he go to Washington and lay the case before Surgeon General Victor Blue. General Blue was deeply interested. He said that he would gladly sent to us one of his experts on trachoma, but that to secure the service of this man it would be necessary for a request to come through the Ohio State Board of Health. We immediately sent an official of the company to Columbus to see the Governor, who issued instructions to the State Board of Health to afford us every means within the power of the board to get to the bottom of this outbreak of disease and to stamp it out.

We then visited the secretary of the Ohio State Board of Health. He expressed great surprise that the local health authorities had done nothing more than they had, and said that the State board was handicapped so far as coming into the village and taking over the fight of the epidemic was concerned. The State board had no funds on hand. He would ask the United States Public Health Service to make a survey and would send us

Courtesy of The Youngstown Sheet & Tube Company.

**A number of outside patients who were treated in the hospital.**

one of his own men in the meantime. Again a State official visited East Youngstown, but found no change in the situation from the time of the first visit (except that a few more cases of trachoma had been reported by us). He called a meeting of the township and village health officers, and it was discovered that the cases placed in quarantine on the occasion of the first visit of the State officers had been released upon orders from some immigrant officer in Cleveland, who informed the local health board that it had no right to hold the men in quarantine. Meanwhile there had been a change of administration in East Youngstown, a new health officer having taken office early in January, 1914. The change did not help matters as the new officer had the same duties as the old one and was no more capable in health and sanitary matters than his predecessor.

### MAJOR SCHERESCHEWSKY'S REPORT ON THE CAUSES OF TRACHOMA CASES IN EAST YOUNGSTOWN.

About the middle of January, 1914, Major J. W. Schereschewsky, of the United States Public Health Service, arrived in East Youngstown and began at once a systematic study of the conditions. He examined 5,962 of our employes and found 76 cases of trachoma, not counting cases he set aside as suspicious. He visited all the schools in East Youngstown and many of the boarding houses. Several cases of trachoma were found in the schools. One of the school teachers was found to have the disease. A number of cases were found among the non-employe residents in the village. After several days spent in this survey and meeting the health officers of Youngstown, East Youngstown, Struthers and Coitsville townships, Dr. Schereschew-

Courtesy of The Youngstown Sheet & Tube Company.

**Fighting trachoma is specially difficult when foreigners have to be handled. Here are four patients, each of a different nationality.**

sky attended a meeting of the village council of East Youngstown and gave a talk on the conditions, with advice as to how to eradicate the disease. Dr. Schereschewsky met the officers of the Youngstown Sheet & Tube Company and laid before them his ideas of the best way to handle the cases we had. These conclusions and recommendations contained in Dr. Schereschewsky's report are given herewith.

1. The origin of trachoma among the employes of the Youngstown Sheet & Tube Company is readily accounted for by the presence among them of chronic cases of the disease, some of which are even now in a state of exacerbation.

2. The crowded unsanitary condition of the lodging houses, where a large proportion of the employes live, amply accounts for the spread of the disease.

3. The presence of recent cases of trachomatous infection shows that under existing conditions the disease is gradually being spread. Unless measures are now undertaken for its control, the prediction seems justified that the disease will gradually gain such headway as, perhaps, to prevail in epidemic form.

4. It seems evident that so long as the present unsanitary conditions obtain in East Youngstown, the control of trachoma will be difficult or impossible unless measures to this end go hand in hand with betterment in the local sanitary condition.

5. The present machinery for the control of the situation is unsatisfactory. The local health officer of East Youngstown is a layman, without the knowledge or training in sanitation to enable him to cope with the situation. The town itself lacks completely the fundamentals for sanitation.

Dr. Schereschewsky's further comments and recommendations:

The Youngstown Sheet & Tube Company is more directly interested in the sanitary conditions in East Youngstown than anyone else.

The efficiency of its employes is affected not only by their environment when at work, but also by that of their homes.

Any effective treatment of the situation must necessarily include specific measures to be adopted at the mills and also the betterment of the sanitary conditions in East Youngstown, if permanent results are to be secured.

METHODS FOR PREVENTING THE SPREAD OF TRACHOMA.

The recommendations made, therefore, relate to two separate ends: first,

Courtesy of The Youngstown Sheet & Tube Company.

**Trachoma cases interned at the hospital wear the uniform here shown.**

the treatment of the situation at the mills, and second, the sanitation of East Youngstown. Besides calling the attention of the company to the usual means for preventing trachoma, such as avoiding the use of the common towel and hand basin and the use of the same bed by two or more individuals, the following special recommendations were made for the company to put into effect at once:

1. No time should be lost in securing a competent physician on full time, at an adequate compensation, who should perform the following duties:

(*a*) Make a complete mental and physical examination of persons applying for employment with the company.

(*b*) Give competent treatment to any individuals found to be afflicted with trachoma or other communicable diseases.

(*c*) If the necessary arrangements can be made this physician could also be the health officer for East Youngstown, and supervise its sanitary condition.

2. A competent graduate trained nurse should be secured who would be able to administer treatment to trachoma cases under this physician's direction.

3. All individuals named in a list furnished the company who are suffering from trachoma, and with respect to whom the notation "Acute," "Recent" or "Severe" was made, should be segregated, preferably in some building controlled by the company, and there furnished competent medical treatment, until such time as the infectiousness of the disease has been removed. They could then be allowed to work conditionally upon reporting daily to the hospital for inspection and treatment.

4. All persons suffering from trachoma, including those segregated in the manner just referred to, should, upon their return to work, be required to report for inspection and treatment twice daily at the hospital. It was suggested in order to secure easy compliance with this recommendation, that these persons secure their time cards at the hospital, and the fact of their having reported there, on going in and out, be attested by a special stamp kept at the hospital.

5. In order to prevent the development of subsequent cases, foreman or those in charge of gangs should be required to submit semi-weekly reports as to the appearance of the eyes of the men under their control. Such reports should not be perfunctory, but should state affirmatively or negatively whether they have observed any cases of reddened or sore eyes in any of the men under their charge. Whenever the eyes of any workmen appear red or sore, such workmen should be sent at once to the hospital for examination.

Courtesy of The Youngstown Sheet & Tube Company.

**Mother taking two children suffering from trachoma to the hospital.**

### IMPROVEMENT OF SANITARY CONDITIONS IN EAST YOUNGSTOWN.

The following recommendations as to the improvement of the sanitary conditions of East Youngstown were made, their realization to constitute part of the future policy of the company as an equivalent for the large taxes paid by the corporation:

1. The provision of an adequate and pure water supply.

2. The installation of a water carriage sewer supply.

3. The abolition of insanitary privies.

4. The installation of catch basins and sewers to dispose of storm waters.

5. The installation of a system of garbage collection and disposal, with ordinances as to the use of sanitary garbage cans with tight-fitting covers.

6. Restriction of overcrowding in lodging houses and regulation of their sanitary condition by a system of licensing and inspection.

7. Numbering of houses and grading of streets.

8. Physical supervision of the children in the schools.

9. The appointment of a properly qualified physician as health officer.

10. Establishment of a hospital and dispensary in East Youngstown.

### HOSPITAL ESTABLISHED BY YOUNGSTOWN SHEET & TUBE COMPANY.

As soon as Dr. J. W. Schereschewsky had made his suggestions to our officials, they asked the council of East Youngstown and township officers to permit the company to establish a hospital for the treatment of persons afflicted with trachoma, regardless of whether they were workmen employed by our company or not; the company to hire the building and fit it out, to furnish nurses, doctors and medicines, and where it was necessary to quarantine patients, to feed and clothe them; the village to supply watchmen, day and night, to prevent the patients from leaving the hospital without permission, and to assist in caring for the patients. The health officer was to give his assistance and look up patients who were not our employes, that were due to receive treatments, but failed to come for them. In the event the village and township were ever financially able to pay their share of the expense, they were to do so.

The village and township officers readily agreed to do this, and the township also agreed to care for the families of any patient when they were in need.

The hospital was opened for the treatment of patients on February 9, 1914.

There was one female graduate nurse, a male nurse and an eye specialist. Beside this the company furnished a cook and helper, waiters for the dining room, two janitors and interpreter,

Courtesy of The Youngstown Sheet & Tube Company.

**Miss Runym, R. N. nurse, and Dr. S. Hartzell, eye specialist.**

and patrolmen to take the quarantined patients walking daily, so they would have proper exercise.

As a patient was admitted to the hospital, he was required to discard all his clothing, bathe and don clean clothing. He was then assigned a room and cot and not permitted to leave the hospital until discharged by the doctor in charge. His own clothes were then to be returned to him, having been washed and fumigated. Three meals were served daily. They were excellent in quality and ample in quantity, as was attested by the staff eating the same food. Treatments were given each morning by the eye doctor, and in the afternoon by the nurse.

The cases that had been listed by Dr. Schereschewsky were taken from the mill on the first day and those that required to be quarantined were placed in the hospital.

Those only requiring treatment were given treatment, and a card record kept of each individual. Each day, after the treatments, the cards were checked up, and if it was found that patients due for treatment had failed to appear, the health officer or our interpreter went out to bring them in.

After the hospital had been opened a few days, circulars were printed in different languages and distributed throughout our mills, telling what trachoma was and what precautions should be taken to prevent its spread, and all persons were asked to send persons they might know to have sore eyes to the hospital.

Placards to the same end, printed in English and eight foreign languages, were posted throughout the mills.

Each case admitted to the hospital or given treatment was assigned to one of the safety department inspectors, who made an investigation of the home or boarding house, to see if additional trachoma cases could be found there.

### CLEANING UP THE COMMUNITY.

Where houses were found to be in an unsanitary condition, the owner or boarding boss was told if they wished to continue as workmen in our mills they must clean up and keep things that way. In the case of boarding houses, the boarding boss was told that unless he cleaned up his place and kept it that way, we would not employ men who boarded with him. A sanitary survey of East Youngstown was made, and the owners of property had pointed out to them unsanitary conditions and were asked to correct them.

Courtesy of The Youngstown Sheet & Tube Company.

**Staff of trachoma hospital. Standing, left to right: J. Putko, interpreter; Dr. S. M. McCurdy, chief surgeon; N. W. Kistler, safety inspector; J. M. Woltz, safety director; F. King, accident clerk; H. Hussey, E. Youngstown health officer. Sitting, left to right: Dr. Buckamp, eye expert; Miss Runym, nurse in charge; M. F. Dillen, safety inspector; Miss Holtz, nurse of Ohio Blind Commission; C. Campbell, hospital manager.**

Courtesy of The Youngstown Sheet & Tube Company.

**Method of treatment administered to trachoma patients in the Youngstown company's hospital.**

A short time after the trachoma hospital opened, the Ohio State Commission for the Blind sent one of their graduate nurses to us, and she has been of great assistance in this work. During the last two months the hospital was open she gave all the treatments except such as were given by the doctor. This nurse was also of great help in visiting the homes and schools of the village and surrounding territory. Had we been without this help, it would have required another trained nurse to do the work she has so efficiently performed.

The conditions developed in our plant and in the village caused most of the other large employers of labor in our vicinity to make an examination of their employes to see to what extent they were troubled with trachoma. All found cases, some a great many, but no other company has done what we have done in caring for the afflicted.

242 PATIENTS, 13,183 INDIVIDUAL TREATMENTS.

It may be interesting to know the number of patients treated in our hospital from February 9, 1914, to August 31, 1914, both dates inclusive, the last date we closed the hospital. The first 32 patients (our full capacity) were quarantined February 9, 1914. The last quarantined patient was released June 10, 1914.

| | |
|---|---|
| Total Number Examined and Treated | 551 |
| Total Number Negative Cases | 309 |
| Total Number Positive Cases | 242 |
| | 551 |
| Total Cases Treated | 242 |
| Total Cases Employes Treated | 187 |
| Total Cases Non-employes Treated | 55 |
| | 242 |
| Total Cases Examined and Treated | 551 |
| Total Cases Employes | 382 |
| Total Cases Non-employes | 169 |
| | 551 |
| Total Cases Quarantined | 62 |
| Total Cases Employes | 54 |
| Total Cases Non-employes | 8 |
| | 62 |

| | |
|---|---|
| Total Cases Operated on | 34 |
| Total Cases Employes | 30 |
| Total Cases Non-employes | 4 |
| | 34 |
| Total Cases Cured by Treatments | 133 |
| Total Cases Employes | 104 |
| Total Cases Non-employes | 29 |
| | 133 |
| Total Cases Cured by Operation | 34 |
| Total Cases Left City Before Treatment Was Complete | 41 |
| Total Cases Discharged 8/31 to Report to Emergency Hospital for a Few Final Treatments | 34 |
| | 109 |
| Total Cases Treated | 242 |

As can be seen from the above figures, we did not confine our work to our employes only. Every case that came to our notice, man, woman or child, was taken and afforded the same medication and attention that was given our own employes.

It is a pleasure to record here that of all the cases treated in our hospital, only one had reached that stage where we were unable to stop the ravages of the disease and preserve at least a portion of the patient's sight. In this case the patient had already lost the sight of one eye, and the other eye was so badly diseased as to make all attempts to save it fruitless. Some of the cases were in an advanced stage, and as is shown, the only way to stop the disease was to operate. In some of these cases, and in a few of the others where there was no operation, there will be a permanent impairment of sight.

We gave 13,183 individual treatments to the 242 patients we treated, an average of about 55 treatments per patient.

After an immense amount of work we have induced the council of East Youngstown to take some steps to clean up the village, but little has been accomplished as yet along this line. A board of health has been appointed, and a physician has been appointed health officer, but the city council has not given the health officers the money necessary to accomplish their work.

If this paper shall cause a single person to turn his attention to remedying conditions that are a crying shame (to American health authorities and physicians in particular) I shall feel amply repaid for the work required to prepare it.

## MINE CAVES AND SURFACE SUPPORT.

The United States Bureau of Mines, in co-operation with the United States Geological Survey, has undertaken additional and more comprehensive investigations pertaining to the problem of mine caves and surface support. The immediate work of the mining engineers and geologists will comprise detailed studies of the extensive open-cut and underground mining operations in southwestern New Mexico. The field investigations will be conducted with special reference to earth pressures and surface subsidence in relation to the geological formation and mining conditions and the equipment and efficiency of the large mechanical installations in operation there.

The Bureau of Mines has already done a large amount of work in the problem of mine caves. Director Holmes and several mining engineers served in an advisory capacity on the board of the Scranton Mine-Cave Commission. Mining engineers of the bureau gave the subject special attention in their studies of European mining methods and conditions. A mining engineer of the bureau served as a member and represented the co-operation of the bureau on the Pennsylvania State Anthracite Mine-Cave Commission, and in the investigations conducted in connection therewith extensive tests of mine-roof supporting materials were made at the Pittsburgh Experimental Station.

The mining engineers and geologists of the bureau co-operated with the Scranton City Council, the Bureau of Mine Inspection and Surface Support, consulting engineers, and the Surface Protective Association in studies and reports for the development of practicable solutions of the serious mine caves occurring during recent years.

# ABRASIVE WHEELS AND GRINDING MACHINES

## SAFETY CODE FOR USE AND CARE OF ABRASIVE WHEELS AND PARTS OF GRINDING MACHINES RELATED THERETO

[Recognizing the lack of appreciation among many users of abrasive wheels, insurance engineers, officials of State Labor Departments and State Factory Inspectors, of the important factors bearing on safety in connection with abrasive wheels, and recognizing that this lack of appreciation is responsible for many easily preventable accidents, the Abrasive Wheel Manufacturers appointed a committee to draft a code for safe practices in relation to abrasive wheels. This code is to be used as the foundation of a campaign for uniform State laws and uniform insurance rules in an endeavor to overcome present and prevent future unsafe practices and also to eliminate much of the confusion existing at present brought about from the lack of uniformity in State and insurance requirements. This lack of uniformity has resulted in a condition which seriously affects every user of abrasive wheels, every manufacturer of abrasive wheels, and every manufacturer of grinding machinery. The code has received the approval of the National Machine Tool Builders' Association.]

THE report of a Special Committee appointed by the National Machine Tool Builders' Association to consider safety in connection with abrasive wheels and grinding machines, and a tentative report of a Special Committee appointed by the State of Pennsylvania to draft laws pertaining to grinding and polishing, were used as a basis of consideration for the code which follows and which has been approved by the following abrasive wheel manufacturers.

Abrasive Material Co., Philadelphia, Pa.

American Emery Wheel Works, Providence, R. I.

Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.

Carborundum Company, Niagara Falls, N. Y.

Canadian-Hart Grinding Wheel Co., Hamilton, Ont., Canada.

Commercial Corundum & Emery Wheel Co., Chicago, Ill.

Cortland Corundum Wheel Co., Cortland, N. Y.

Dayton Grinding Wheel Co., Dayton, Ohio.

Detroit Grinding Wheel Co., Detroit, Mich.

Dominion Abrasive Wheel Co., Toronto, Canada.

Hampden Corundum Wheel Co., Springfield, Mass.

Manhattan Rubber Manufacturing Co., New York City.

National Corundum Wheel Co., Buffalo, N. Y.

New York Belting and Packing Co., New York City.

Norton Company, Worcester, Mass.

Pittsburgh Emery Wheel Co., Pittsburgh, Pa.

Safety Emery Wheel Co., Springfield, Ohio.

Springfield Mfg. Co., Bridgeport, Conn.

Star Corundum Wheel Co., Detroit, Mich.

Sterling Grinding Wheel Co., Tiffin, Ohio.

Superior Corundum Wheel Co., Waltham, Mass.

Vitrified Wheel Co., Westfield, Mass.

Waltham Emery Wheel Co., Waltham, Mass.

*The code has also been approved by the National Machine Tool Builders' Association.*

Abrasive wheel manufacturers recommend three general types of safety devices to be used for grinding wheels, namely, protection flanges, protection hoods and protection chucks.

### PROTECTION FLANGES.

A1. The abrasive wheel manufacturers recommend protection flanges of the double or single concave type, used in conjunction with wheels having double or single convex tapered sides or side.

A2. Flanges of the sizes shown opposite wheel diameters in column C, article A9, shall be used. As wheels wear, size of flanges as indicated in column C, article A9, shall be maintained.

A3. New installations of protection flanges for double tapered wheels shall have a taper of not less than three-quarters (¾) of an inch to the foot for

each flange, and the center of flange shall conform with the dimensions shown in column B, article A9. Such flanges shall be of a thickness not less than is shown in column D, article A9.

A4. New installations of protection flanges for single tapered wheels shall have a taper of not less than three-quarters (¾) of an inch to the foot and the center of flange shall conform with dimensions shown in column B, article A9. Thickness of such flanges shall be as shown in column F, article A9.

A5. Each flange, whether straight or tapered, shall be relieved or recessed at the center at least one-sixteenth (1/16) of an inch on the side next to the wheel for a distance as specified in column E, article A9.

A6. All tapered flanges over ten (10") inches in diameter shall be of steel, or other material of equal strength. Tapered flanges ten (10") inches and smaller in diameter may be made of cast iron.

A7. All flanges shall be accurately turned, correct to dimensions and in balance, except flanges which are purposely made out of balance. Two such flanges are known as balancing flanges and are sometimes used to counteract out of balance condition in an abrasive wheel.

A8. Both flanges in contact with the wheels shall be of the same diameter.

A9. DIMENSIONS OF TAPERED FLANGES AND TAPERED WHEELS WHERE HOODS ARE NOT USED IN CONJUNCTION THEREWITH.

A = Maximum flat spot at center of flange.
B = Flat spot at center of wheel.
C = Minimum diameter of flange.
D = Minimum thickness of flange at bore.
E = Minimum diameter of recess in taper flanges.
F = Minimum thickness of each flange for single taper at bore.

| Diameter of Wheel | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 6"..... | 0" | 1" | 3" | ⅜" | 2" | ⅜" |
| 8"..... | 0" | 1" | 5" | ⅜" | 3½" | ⅜" |
| 10"..... | 0" | 2" | 6" | ½" | 4" | ½" |
| 12"..... | 4" | 4½" | 6" | ⅝" | 4" | ⅝" |
| 14"..... | 4" | 4½" | 8" | ⅝" | 5½" | ¾" |
| 16"..... | 4" | 6" | 10" | ⅝" | 7" | ⅞" |
| 18"..... | 4" | 6" | 12" | ¾" | 8" | 1" |
| 20"..... | 4" | 6" | 14" | ¾" | 9" | 1" |
| 22"..... | 4" | 6" | 16" | ¾" | 10½" | 1⅛" |
| 24"..... | 4" | 6" | 18" | ¾" | 12" | 1⅛" |
| 26"..... | 4" | 6" | 20" | ¾" | 13½" | 1⅛" |
| 28"..... | 4" | 6" | 22" | ⅞" | 14½" | 1¼" |
| 30"..... | 4" | 6" | 24" | ⅞" | 16" | 1¼" |

## PROTECTION HOODS.

B1. Protection hoods shall always be used where practical with wheels not provided with protection flanges. Hoods shall be designed, and constructed of a material, sufficiently strong to retain all pieces of a broken grinding wheel.

B2. Hoods shall conform as nearly as possible to the periphery of the wheel, and shall be so designed as to leave exposed the least portion of the wheel compatible with the work, and shall be of the adjustable type or provided with a sliding tongue or similar device, or a method of contracting the rim, for the purpose of closing the opening in the hood as the wheel is reduced in diameter, to afford maximum protection at all times.

B3. Protection hoods must be securely fastened to the grinding machine or floor.

B4. Protruding ends of the wheel arbors and their nuts shall be guarded.

## CUPS, CYLINDERS AND SECTIONAL RING WHEELS.

C1. Cups, cylinders and sectional ring wheels shall be either protected with hoods, or enclosed in protection chucks, or surrounded with protection bands. Not more than one-quarter (¼) of the height of such grinding wheels shall protrude beyond the provided protection.

## GENERAL SAFETY REQUIREMENTS.

D1. Competent men shall be assigned to the mounting, care and inspection of grinding wheels and machines.

D2. Before mounting, all wheels shall be closely inspected to make sure that they have not been injured in transit, storage or otherwise.

For added precaution wheels other than of the elastic and vulcanite type should be tapped lightly with a hammer, if they do not ring with a clear tone they should not be used. Damp wheels when tapped with a hammer may not give a clear tone. Wheels must be dry and free from saw dust when applying this test.

D3. Grinding wheels shall fit freely on

Note: Where hoods are used in conjunction with tapered wheels and tapered flanges, the specifications given in article D 12 may be followed.

the spindles, they shall not be forced on nor shall they be too loose.

D4. Wheel arbor holes shall be made .005 inch larger than the machine arbor.

D5. The soft metal bushing shall not extend beyond the sides of the wheel at the center.

D6. MINIMUM SIZES OF MACHINE SPINDLES IN INCHES FOR VARIOUS DIAMETERS AND THICKNESSES OF GRINDING WHEELS. (See table below.)

D7. Ends of spindles shall be threaded left and right so that the nuts on both ends will tend to tighten as the spindles revolve. Care should be taken in setting up machines that the spindles are arranged to revolve in the proper direction, else the nuts on the ends will loosen. (See article D16.)

| A Diameter of wheel | B Minimum outside diameter of flange | C Minimum diameter of recess | D Minimum thickness of flange at bore |
|---|---|---|---|
| 6″ | 2″ | 1″ | 3/8″ |
| 8″ | 3″ | 2″ | 3/8″ |
| 10″ | 3 1/2″ | 2 1/4″ | 3/8″ |
| 12″ | 4″ | 2 3/4″ | 1/2″ |
| 14″ | 4 1/2″ | 3″ | 1/2″ |
| 16″ | 5 1/2″ | 3 1/2″ | 1/2″ |
| 18″ | 6″ | 4″ | 5/8″ |
| 20″ | 7″ | 4 1/2″ | 5/8″ |
| 22″ | 7 1/2″ | 5″ | 5/8″ |
| 24″ | 8″ | 5 1/2″ | 5/8″ |
| 26″ | 8 1/2″ | 6″ | 5/8″ |
| 28″ | 10″ | 7″ | 3/4″ |
| 30″ | 10″ | 7″ | 3/4″ |

D13. Wheels shall never be run without flanges.

| Diameter in inches | Thickness of Wheel, in Inches. | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | 1 1/4 | 1 1/2 | 1 3/4 | 2 | 2 1/4 | 2 1/2 | 2 3/4 | 3 | 3 1/4 | 3 1/2 | 4 | 4 1/2 | 5 |
| 6..... | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 5/8 | 5/8 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 1 | 1 | 1 |
| 7..... | 1/2 | 1/2 | 1/2 | 1/2 | 5/8 | 5/8 | 5/8 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 1 | 1 | 1 | 1 | 1 | 1 |
| 8..... | 5/8 | 5/8 | 5/8 | 5/8 | 5/8 | 5/8 | 3/4 | 3/4 | 3/4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 1/4 | 1 1/4 | 1 1/4 |
| 9..... | 5/8 | 5/8 | 5/8 | 5/8 | 3/4 | 3/4 | 3/4 | 3/4 | 1 | 1 | 1 | 1 | 1 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 |
| 10..... | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 1 | 1 | 1 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/2 | 1 1/2 |
| 12..... | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/2 | 1 1/2 | 1 1/2 |
| 14..... | 7/8 | 7/8 | 7/8 | 7/8 | 1 | 1 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 |
| 16..... | .. | .. | .. | .. | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 3/4 | 1 3/4 | 1 3/4 | 1 3/4 |
| 18..... | .. | .. | .. | .. | 1 1/4 | 1 1/4 | 1 1/4 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 3/4 | 1 3/4 | 1 3/4 | 1 7/8 | 1 7/8 |
| 20..... | .. | .. | .. | .. | .. | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 1/2 | 1 3/4 | 1 3/4 | 1 3/4 | 1 7/8 | 1 7/8 | 1 7/8 | 1 7/8 |
| 24..... | .. | .. | .. | .. | .. | 1 1/2 | 1 1/2 | 1 1/2 | 1 3/4 | 1 3/4 | 1 3/4 | 1 3/4 | 1 3/4 | 1 3/4 | 2 | 2 | 2 | 2 | 2 |
| 26..... | .. | .. | .. | .. | .. | .. | 1 1/2 | 1 1/2 | 1 3/4 | 1 3/4 | 1 3/4 | 1 3/4 | 2 | 2 | 2 | 2 | 2 1/4 | 2 1/4 | 2 1/4 |
| 30..... | .. | .. | .. | .. | .. | .. | .. | 1 3/4 | 1 3/4 | 2 | 2 | 2 | 2 | 2 | 2 1/4 | 2 1/4 | 2 1/2 | 2 1/2 | 2 1/2 |
| 36..... | .. | .. | .. | .. | .. | .. | .. | .. | 2 | 2 1/4 | 2 1/4 | 2 1/4 | 2 1/2 | 2 1/2 | 2 1/2 | 2 3/4 | 2 3/4 | 3 | 3 |

D8. Wheel spindles shall be of sufficient length to permit of the nut being drawn up at least flush with the end of the spindle, thus providing a bearing for the entire length of nut.

D9. The surfaces of wheels in contact with straight or tapered flanges, the surfaces of the flanges in contact with the wheels and the wheel washers between the flanges and wheels shall be clean, smooth and free from foreign material.

D10. Size of straight flanges for straight wheels shall not be less than shown by column B, section D12.

D11. All straight flanges shall be relieved or recessed at the center at least one-sixteenth (1/16) of an inch on the inside surface of flange, for a diameter as specified in column C, article D12.

D12. STRAIGHT FLANGES AND STRAIGHT WHEELS USED WITH PROTECTION HOODS.

D14. Both flanges in contact with the wheels shall be of the same diameter whether straight or tapered.

D15. Wheel washers of compressible material such as blotting paper, rubber or leather, not thicker than approximately 0.025 inch, shall be fitted between the wheel and its flanges. It is recommended that the wheel washers be slightly larger than the diameter of the flanges used.

D16. When tightening clamping nuts, care shall be taken to tighten same only enough to hold the wheel firmly, other wise the clamping strain is apt to crack the wheel.

D17. Flanges, whether straight or tapered, must be frequently inspected, to guard against the use of flanges which have become bent or sprung out of true. or out of balance. If a tapered wheel has broken, the tapered flanges must be carefully inspected for truth before using with a new wheel. Clamping nuts shall also be inspected.

D18. The work rest must be kept adjusted close to the wheel to prevent the work from being caught. Work rests must be rigid and always securely clamped after each adjustment.

D19. (1) A speed of 5,000 peripheral feet per minute is recommended as the standard operating speed for vitrified and silicate straight wheels, tapered wheels and shapes other than those known as cup and cylinder wheels, which are used on bench floor, swing frame and other machines for rough grinding. Speeds exceeding 5,000 feet may be used upon recommendation of the wheel manufacturer but in no case shall a speed of 6,500 peripheral feet per minute be exceeded.

(2) A speed of 4,500 peripheral feet per minute is recommended as standard operating speed for vitrified and silicate wheels of the cup and cylinder shape, used on bench, floor, swing frame and other machines for rough grinding. Speeds exceeding 4,500 peripheral feet per minute may be used upon recommendation of the wheel manufacturer but in no case shall 5,500 peripheral feet per minute be exceeded.

D20. For elastic, vulcanite and wheels of other organic bonds, the recommendations of individual wheel manufacturers shall be followed.

D21. For precision grinding an operating speed of 6,500 peripheral feet per minute may be recommended. Speeds higher than 6,500 peripheral feet per minute can be used only upon recommendation of the wheel manufacturer.

D22. The following table gives revolutions per minute for various sizes of wheels for the peripheral velocities at the head of each column.

REVOLUTIONS PER MINUTE FOR VARIOUS SIZES OF GRINDING WHEELS TO GIVE PERIPHERAL SPEED IN FEET PER MINUTE AS INDICATED BY THE FOLLOWING TABLE:

| Diameter of wheel in inches | 4000 | 4500 | 5000 | 5500 | 6000 | 6500 |
|---|---|---|---|---|---|---|
| 1 | 15279 | 17200 | 19099 | 21000 | 22918 | 24850 |
| 2 | 7639 | 8590 | 9549 | 10500 | 11459 | 12420 |
| 3 | 5093 | 5725 | 6366 | 7000 | 7639 | 8270 |
| 4 | 3820 | 4295 | 4775 | 5250 | 5730 | 6205 |
| 5 | 3056 | 3440 | 3820 | 4200 | 4584 | 4970 |
| 6 | 2546 | 2865 | 3183 | 3500 | 3820 | 4140 |
| 7 | 2183 | 2455 | 2728 | 3000 | 3274 | 3550 |
| 8 | 1910 | 2150 | 2387 | 2635 | 2865 | 3100 |
| 10 | 1528 | 1720 | 1910 | 2100 | 2292 | 2485 |
| 12 | 1273 | 1453 | 1592 | 1750 | 1910 | 2070 |
| 14 | 1091 | 1228 | 1364 | 1500 | 1637 | 1773 |
| 16 | 955 | 1075 | 1194 | 1314 | 1432 | 1552 |
| 18 | 849 | 957 | 1061 | 1167 | 1273 | 1380 |
| 20 | 764 | 860 | 955 | 1050 | 1146 | 1241 |
| 22 | 694 | 782 | 868 | 952 | 1042 | 1128 |
| 24 | 637 | 716 | 796 | 876 | 955 | 1035 |
| 26 | 586 | 661 | 733 | 809 | 879 | 955 |
| 28 | 546 | 614 | 683 | 749 | 819 | 887 |
| 30 | 509 | 573 | 637 | 700 | 764 | 827 |
| 32 | 477 | 537 | 596 | 657 | 716 | 776 |
| 34 | 449 | 506 | 561 | 618 | 674 | 730 |
| 36 | 424 | 477 | 531 | 534 | 637 | 689 |
| 38 | 402 | 453 | 503 | 553 | 603 | 653 |
| 40 | 382 | 430 | 478 | 525 | 573 | 621 |
| 42 | 364 | 409 | 455 | 500 | 546 | 591 |
| 44 | 347 | 391 | 434 | 477 | 521 | 564 |
| 46 | 332 | 374 | 415 | 456 | 498 | 539 |
| 48 | 318 | 358 | 397 | 438 | 477 | 517 |
| 50 | 306 | 344 | 383 | 420 | 459 | 497 |
| 52 | 294 | 331 | 369 | 404 | 441 | 487 |
| 54 | 283 | 318 | 354 | 389 | 425 | 459 |
| 56 | 273 | 307 | 341 | 366 | 410 | 443 |
| 58 | 264 | 296 | 330 | 354 | 396 | 428 |
| 60 | 255 | 277 | 319 | 350 | 383 | 414 |

D23. Machine spindle shall be tested and determined correct for size of wheel to be operated before wheel is mounted, and shall never be changed as a wheel is reduced in diameter, except by men assigned for such duties.

D24. If a wheel spindle is driven by a variable speed motor, speed control of the motor shall be enclosed in a locked case, or some device shall be used which prevents motor from being run at too high speeds.

D25. Grinding machines shall be sufficiently heavy and rigid to prevent vibration, and they should be securely mounted on substantial foundations.

D26. No user of wheels shall use on any given machine a wheel of larger diameter or greater thickness than specified by the machine builder.

D27. Wheels which wear out of round shall be trued by a man assigned to that duty. If wheels become out of balance through wear and cannot be balanced by truing or dressing, they should be removed from the machine.

D28. A wheel used in wet grinding shall not be allowed to stand partly immersed in the water. Water-soaked portion may throw the wheel dangerously out of balance.

D29. Wheel dressers should be equipped with rigid sheet metal or other guards over the tops of the cutters, to protect operator from flying pieces of broken cutters.

D30. Goggles shall be provided for use of grinding wheel operators where there is danger of eye injury. They should be readily accessible, or better, should be the individual property of the operator. Where this is not done, men should be urged to wash their faces immediately before and after using the goggles.

D31. The space about the machine shall be kept dry, clean and as free as possible from castings or other obstructions.

D32. Grinding rooms shall not only be well ventilated and well lighted, but kept warm and dry, machines shall be attached to a dust-exhausting system. Besides protection to the workmen, the dust exhausting system prevents wear and tear on machinery and belts.

D33. Care shall be exercised in the storage of wheels. They shall be stored in dry places and should be well supported on edge in racks.

Work shall not be forced against a cold wheel but the work applied gradually, giving the wheel an opportunity to warm and thereby eliminate possible breakage. This applies to starting work in the morning in grinding rooms which are not heated in winter and new wheels which have been stored in a cold place.

## PRECAUTIONARY SUGGESTIONS.

E1. It is recommended that where possible, straight flanges of the dimensions shown in article D12 be used in conjunction with protection flanges. This recommendation is made as additional protection, for added strength to safety flanges.

E2. Cone pulleys determining the speed of a wheel should never be used unless belt locking devices are provided.

E3. The maximum size of wheel which should be used with given operating speeds should be indicated on each machine.

E4. Grinding machines should be provided with a stop or some method of fixing the maximum size of wheel which may be used, at the speed at which the wheel spindle is running.

E5. Boxes must be of proper length to provide an ample bearing surface, and prevent heating or rapid wear. It is important that the bearings be kept well lubricated and properly adjusted. Ring oiling devices are recommended, amply protected from dust and grit, and box caps should be adjusted for take-up.

E6. For protection against flying chips, etc., plate glass in metal frames can be placed just above the grinding spaces of the wheels.

E7. Where it is impracticable or undesirable to use a glass shield, a leather flap may be attached to the hood and adjusted so as to interrupt sparks and dust.

E8. This committee suggests that the National Machine Tool Builders' Association be requested to form a joint committee with this committee to consider matters relating to safety in connection with grinding wheels.

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## PROPER EYE PROTECTORS.

In a large shop in New York State all the chippers are provided with eye protectors. A short time ago one of the workmen was struck in the eye by a very heavy chip of metal which drove the glass back through the frame of the protection glasses he was wearing. His eye was so seriously injured by the glass that it had to be removed. These protectors offered no protection from the broken glass. The case was settled for over $4,000.

On the other hand, one of the largest steel works in the country provides the men with safety glasses which have a safety flange extending over the back of the glass. This flange prevents glass going through and injuring the eye. The other day one of its workmen was struck by a swinging crane hook. The force of the blow smashed the glasses and stunned the man, but not an atom of glass entered his eye.

This shows that the danger is not so much, as many believe, from small pieces of glass as from all the glass being driven through the frame and cutting through the eyelid and eyeball. The safety flange referred to has been approved and adopted by many of the largest industrial companies.

# SAFETY IN HOISTING AND SLINGING

## PROPERTIES, USE AND CARE OF MANILA ROPE, WIRE CABLE AND CHAINS

*By A. V. Francis*

IT is in the machine-shop field that the safety movement has received its greatest impetus, and from the number of guards and safety devices placed on machinery it is already generally predicted that the time will soon come, if indeed it is not here already, when the guiding element in the purchase of machinery of rival makers will be "which is best guarded."

The safety feature has become so thoroughly organized in the machine-shop field that it is surprising to find any place therein where the question of safety has not received thorough and practical attention. Such a place, however, seems to be under the crane when slinging or conveying castings, forgings and the like. What may be stated in connection with this phase of safety, so far as the machine shop is concerned, is equally applicable to all other branches of industry where heavy loads are transported by the use of chains and ropes.

From the safety point of view there are two main considerations when conveying loads under the crane. First, it is necessary that the proper types of knots be used in fastening various kinds of loads and secondly the question of strength and endurance of the ropes and chains used for the slinging should be carefully weighed and comprehensively tabulated Comparatively, the second consideration has become by all odds the more important, for the number of accidents owing to improper fastening of loads has decidedly diminished in recent years. There is still much to be learned, however, in the formation of proper knots for slinging various loads. From the practical side it is not only necessary to use knots that will be absolutely secure but such knots must be of a type that can be readily undone.

In the accompanying illustrations, the practice of the General Electric Company is illustrated and after the following brief remarks concerning the knots shown the question of strength and endurance may be discussed more profitably.

### VARIOUS FORMS OF KNOTS.

In the first three illustrations, Figs. 1 to 3, the steps in making a bowline knot are shown. This form of knot is commonly used for the ends of temporary guy ropes to be slipped over a post or made fast around some part of a building and is in great favor because it will neither slip nor jam.

In Fig. 4 is shown a close or double-half hitch, another form used for purposes similar to that of the bowline knot. In this form the greater the stress the tighter the knot grips, with consequent difficulty in releasing. In Fig. 7 this knot is shown formed around a hook. The knot shown in Fig. 5 is termed a square or reef knot and is used only for joining two ropes together. The next knot, Fig. 6, is called a sheet bend in an eye and is generally used for an adjustable sling. Fig. 10 shows a timber and half hitch especially adapted for lifting timbers or shafting in a vertical position. For handling similar products in a horizontal position the plain timber hitch, Fig. 8, is sufficiently effective. The blackwall hitch, Fig. 9, is especially useful for hauling material on the level. In Figs. 11 and 12 the unsafe and safe way of lifting a load by cable or rope slings are illustrated. The single sling shown in the former represents the hazardous practice which should never be followed when hooked by a spliced eye. When the weight is sufficient, the cable or rope is likely to untwist, thus allowing the splices to open and slip in the way shown. The use of the double sling shown in Fig. 12 is a safe method, and in this illustration it is also shown how cables or ropes should be protected from sharp corners by the use of pads.

In the use of slings, especially of ropes, it is important to insure proper laying so that one rope does not lay on top of

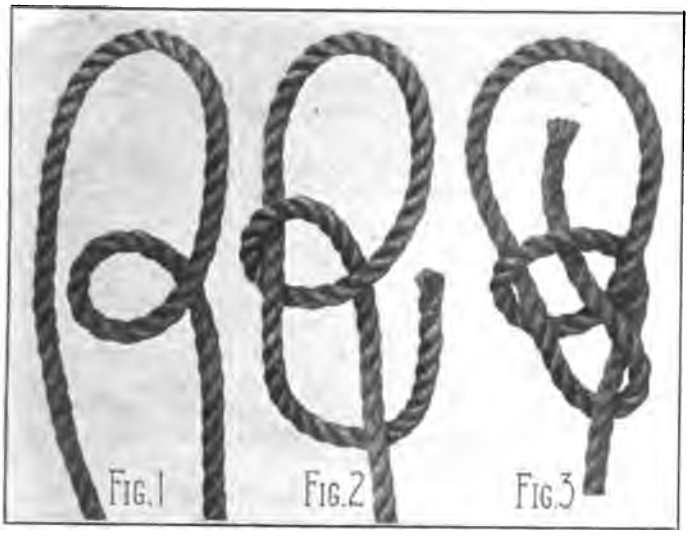


**Fig. 1. First step in making bowline knot.**

**Fig. 2. Second step in making bowline knot.**

**Fig. 3. Completed bowline knot.**

another, thus preventing proper equalization and undue strain on the outer rope.

Another important point to be avoided in handling work under the crane is too sudden a stoppage of the load. The lowering speed should never exceed the hoisting speed and special care should be exercised in applying the brakes gradually, otherwise the increased strain can result in serious accident.

STRENGTH AND ENDURANCE OF SLINGS.

In most shops the conveying of heavy parts by slings is left entirely to the judgment of the workman. In the nature of the case, where the workman's principal object is to get the work out, it is not to be expected that he will go through the necessary process of calculating weights and stresses. He looks at the casting or other load, guesses at its weight and guesses what size of rope or chain to use. It may be true that his guesses are often accurate; but where safety is concerned, it will be readily agreed, guessing should not be countenanced, as surely it is not in accord with other branches of engineering work.

In general, less danger is likely to be incurred in handling the heavier loads and weights, since in such cases the larger values involve more care in preparation and making the hitches. Moreover, in such cases it is quite likely that someone in responsible charge will be on the lookout to guard against any possible accidents. It is with the more common, medium and light weight loads where the bulk of the danger prevails. Here the old story of familiarity breeding contempt is substantiated abundantly. Furthermore, on account of the specially great exertion necessitated by the handling of heavy chains, the workmen are likely to use the lightest chains with which they dare take a chance.

There seem to be two ways in which this subject of slinging should be analyzed and remedies applied. In the first place, a table should be prepared covering the permissible weights for the various sizes of ropes and chains and copies of this table should be distributed intelligently and posted conspicuously in the shop. Even where this is done at present, mention of whether the rope or chain should be used as a single, double or triple sling is often omitted. This item is important, for the allowable weights are different for the three cases. In the accompanying table these weights are given.

The relative merits of ropes and chains are an open question. In favor of the former it may be said that ordinary warning is given of impending failure through the tearing of the fibers and the strands becoming frayed, loose or cut, while on the other hand unless the workmen are careful to place pads over

sharp corners when slinging ropes over them a cutting action sets in which sometimes progresses with rapid and disastrous results. This protection by pads is just as applicable to wire cable slings which are now so largely used in hoisting.

THE QUESTION OF ANNEALING CHAINS.

In the use of a lifting chain, now so widely spread, the chief danger lies in the fact that its deterioration is not apparent to the eye, while the danger of failure may be imminent. It is known that crystallization takes place in chains under continual use and that overload sets up molecular strains. A common provision to counteract the effects of such crystallization and molecular strains is to anneal the chain periodically, a process calculated to restore it to its original condition. Recently the wisdom of this annealing process has been questioned and the importance of the problem is indicated by the fact that at the recent conference of the National Safety Council in Chicago it received animated discussion. The gist of this discussion was that to be efficacious the annealing must be carried out by experts thoroughly acquainted with the proper temperatures and that unless carried on properly it would work more harm than good. An idea of the neglect that has been generally exercised in connection with the subject will be formed when it is stated that although annealing of chains has been common practice, but few shops take into consideration the carbon content. The annealing process has been practiced on the assumption that it is beneficial but beyond this further details have been generally neglected.

For sometime past this phase of safety work has been given close attention at the works of the Brown & Sharpe Manufacturing Company, Providence, R. I., and from tests conducted there it seems that the annealing process, although traditional, is productive of slightly injurious effects. When it is considered that these tests were made with every detail carefully checked, the possible harm that may be done in blindly following the traditional annealing process without proper facilities and understanding will be appreciated. While on this subject, it may be well to present the following table of annealing temperatures recommended and adopted by the American Society for Testing Materials:

| Per Cent. of Carbon Content. | Annealing Temperatures. Deg. C. | Deg. F. |
|---|---|---|
| Less than 0.12 | 875—925 | (1607—1697) |
| 0.12 to 0.29.. | 840—870 | (1544—1598) |
| 0.30 to 0.49.. | 815—840 | (1499—1598) |
| 0.50 to 1.00.. | 790—815 | (1454—1499) |

There is a certain amount of safety in

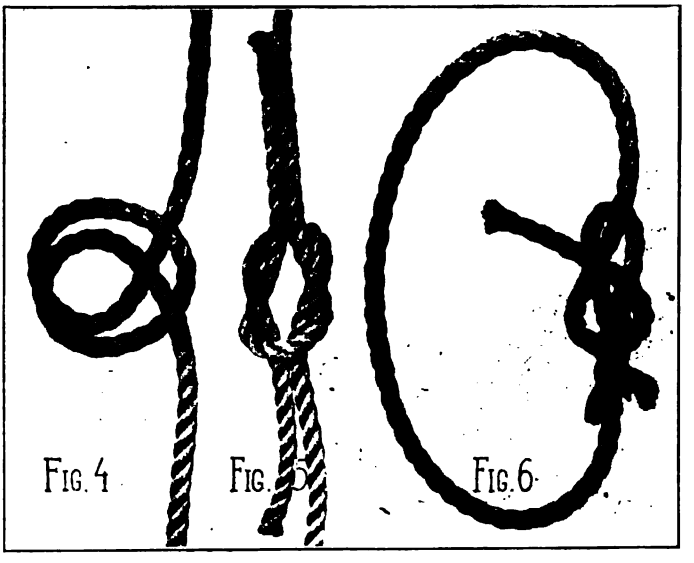


Fig. 4. Close or double-half hitch.

Fig. 5. Square or reef knot.

Fig. 6. Sheet bend in an eye.

COMPARATIVE TABULATION OF ALLOWABLE WEIGHTS.

| Manila Rope. Safe Load in Tons. | | | | Wire Cable. Safe Load in Tons. | | | | Chains. Safe Load in Tons. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dia. of Rope in Ins. | Single Rope. | Two Part. | Four Part. | Dia. of Cable in Ins. | Single Cable. | Two Part. | Four Part. | Dia. of Chain in Ins. | Single Chain. | Two Part. | Four Part. |
| ½ | ⅛ | ¼ | ½ | ½ | 1 | 2 | 3½ | ¼ | ½ | ⅞ | 1½ |
| ⅝ | ¼ | ½ | ¾ | ⅝ | 1¾ | 3¼ | 6½ | ⅜ | 1 | 1¾ | 3 |
| ¾ | ⅜ | ¾ | 1¼ | ¾ | 2½ | 4½ | 9 | ½ | 2 | 3½ | 6 |
| ⅞ | ½ | 1 | 2 | ⅞ | 3¼ | 6 | 12 | ⅝ | 3 | 5 | 9 |
| 1 | ¾ | 1½ | 2½ | 1 | 4 | 8 | 16 | ¾ | 5 | 9 | 15 |
| 1¼ | 1 | 2 | 3 | 1¼ | 6 | 12 | 24 | ⅞ | 6 | 10½ | 18 |
| 1½ | 1¼ | 2½ | 4 | 1½ | 10 | 19 | 36 | 1 | 8 | 14 | 24 |
| 1¾ | 2 | 4 | 6 | 1¾ | 13 | 25 | 48 | 1⅛ | 11 | 19 | 33 |
| 2 | 2½ | 5 | 8 | 2 | 16 | 32 | 60 | 1¼ | 13 | 23 | 39 |
| 2¼ | 3½ | 6½ | 11 | .. | .. | .. | .. | 1½ | 18 | 32 | 54 |
| 2½ | 4½ | 8 | 13 | .. | .. | .. | .. | .. | .. | .. | .. |

purchasing tested chains from only reliable makers, but this does not insure total protection. Aside from the question of upkeep it must not be forgotten that chains are often cut into lengths and made into slings by the addition of end links, rings and hooks which are usually forged locally. Although it is axiomatic that a chain is only as strong as its weakest part these added links, rings or hooks are rarely tested.

In the case of castings, a system followed in some foundries of painting the weight of each casting directly thereon is a decided safeguard, inasmuch as guess work or the necessity for calculation by the more careful is eliminated. Another desirable safeguard on the part of chain makers is to have the carrying capacity of the chain stamped on the hooks or end links, although, as previously mentioned, the practice of locally increasing the length of a chain, without proper testing, would counteract the utility of such a practice.

There can be no doubt that it is pos-

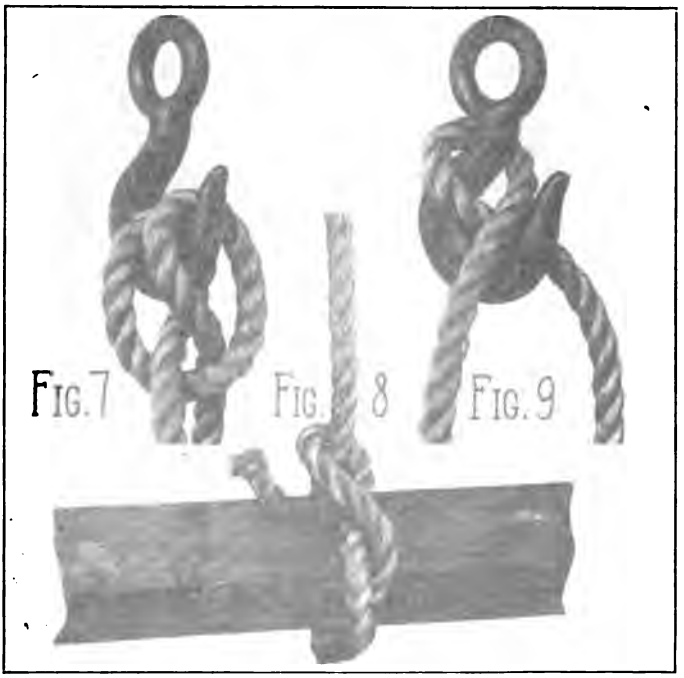


**Fig. 7. Close or double-half hitch over hook.**

**Fig. 8. Plain timber hitch.**

**Fig. 9. Simple blackwall hitch.**

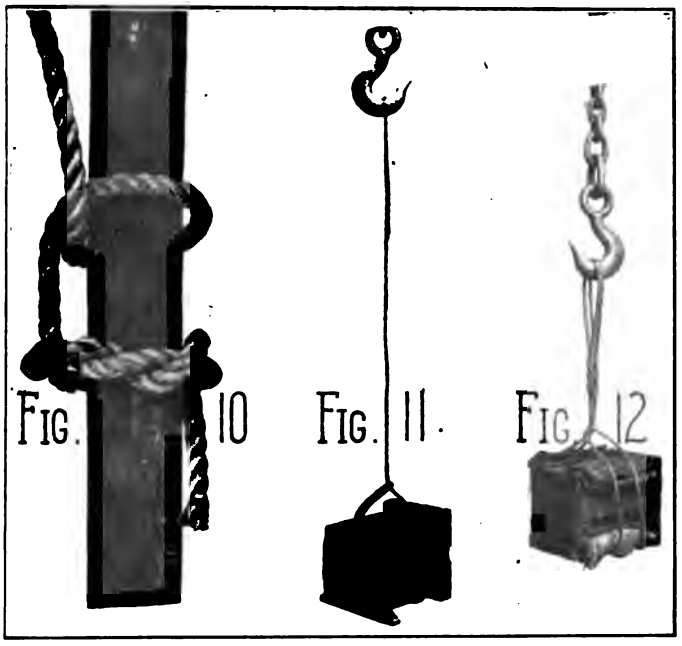


**Fig. 10. Timber hitch and half hitch.**

**Fig. 11. Single cable sling lifting load; dangerous way.**

**Fig. 12. Double cable sling lifting load; safe way.**

sible to work out a systematic and comprehensive system of avoiding accidents in the conveyance of loads under the crane and it is expected that the attention that now seems to be centering on this particular branch of safety work will bring about such a result.

## NEW JERSEY MANUFACTURERS

Accident prevention and health conservation were features of the programme of the Second Annual Convention of the Manufacturers' Association of New Jersey, held on January 12 at the Washington Auditorium, Newark.

M. W. Alexander, secretary of the Conference Board on Safety and Sanitation, spoke on "Standardization in Safety and Sanitation." Dr. Eugene L. Fiske, medical director of the Life Extension Institute of New York, delivered an address on "Health of Employes." Manufacturers representing practically every important industry listened attentively as the speakers pointed out the relation of health and safety to efficiency.

The association adopted a resolution indorsing Labor Commissioner Lewis T. Bryant for head of the proposed new State Labor Department. A bill is now in the New Jersey Legislature to create this new department by merging the present labor department and the Bureau of Vital Statistics.

J. Philip Bird was re-elected president of the association for 1915. The following gentlemen also addressed the convention: Mayor Raymond of Newark, James A. Emery, general counsel of the National Council for Industrial Defense, Attorney General Robert H. McCarter, and Frank S. Katzenbach.

## EFFECTIVE CO-OPERATION.

The Bureau of Labor Statistics of the New York Department of Labor says that the Joint Board of Sanitary Control, by establishing and enforcing wise sanitary standards, remedying defects in sanitation and fire protection, investigating health conditions among the workers, and conducting educational work both among employers and employes, has rendered distinct service in the clothing industry, which is of special significance because the work is done by the interested parties and not by outsiders, and on this account has secured the co-operation of the employers and the employes alike.

# NATIONAL SAFETY COUNCIL

*IN THIS DEPARTMENT WILL APPEAR ARTICLES AND NEWS CONCERNING THE NATIONAL SAFETY COUNCIL AND ITS LOCAL COUNCILS FURNISHED EXCLUSIVELY TO "SAFETY ENGINEERING"*

## CHICAGO LOCAL COUNCIL NO. 3.

MEETING December 12, Fort Dearborn Hotel, Chicago; 85 members present at dinner, 135 at the meeting. Dinner commenced at 6 p. m., meeting adjourned 10.15 p. m. H. J. Bell, president, acted as chairman; A. W. Hitchcock, secretary, reported the proceedings. George Shepherd, member of safety committee, Illinois Steel Company, South Works, Chicago, read a paper entitled "Safety from the Viewpoint of the Workman." Mr. Shepherd's paper appears on page 60. The following interesting facts and ideas came out in the discussion:

SAFETY COMMITTEES.—A question was asked "Is the Ideal Safety Committee Made Up of Workmen?" and the reply was made, "I believe the better committee is made up of officials and workmen, because the official acts as a check on the workman from making impractical suggestions, or unreasonably expensive changes." An official was designated to be a foreman, or other higher official; that workmen should learn that they will not get into trouble by complaining about inefficiencies of fellow workmen; that men are given from one to three chances before they are disciplined for mistakes; that the man opposed to safety should be put on the safety committee.

SAFETY ON RAILROADS.—One of the railroad safety men reported this interesting item: "As freight cars are cleaned out, many boards with nails in them, broken glass, etc., are thrown on the right-of-way, or on the shop floors. The safety movement has changed this procedure. As soon as the freight cars are pulled out, a force of men immediately 'clean up'—removing the boards, glass, etc."

CARING FOR WORKMEN'S TOOLS FROM THE SAFETY STANDPOINT.—One member reported that the assistant foreman in one machine shop inspects all tools once a month and reports on their condition. Another member reported that the foreman of his shop complained that after grinding the heads from tools they would be in as bad condition again after a few hours' use. He recommended study of the improvement in the steel used in making various classes of tools. The present practice in his shop is to attach a red tag to all tools requiring repairs, which means that they must go to the blacksmith shop before being used again. After repairs are made the tags are sent to the safety inspector's office.

THE RELATION OF PIECE WORK TO ACCIDENT FREQUENCIES.—One member reported that safeguards did not often reduce the speed of the machines in his plants, and that in a few cases where this had actually occurred, the piece work rate had been increased to meet the slowing-up. Another interesting comment was that men working on a tonnage basis now realize that an accident means a shut-down, or interference with maximum output, and they are more anxious than ever to protect their own earnings by helping to reduce accidents. Dr. Harvey, of the Crane Company, stated that in all his experience he had not noticed much difference in the number of accidents as between piece workers and day workers. He said, "The piece workers may be more quickly fatigued, but the difference is so slight that I do not believe it is appreciable."

SECURING AND TRAINING GREEN MEN.—Three interesting opinions were given

as to the money loss involved in "breaking-in" new men to fill the places of those killed, or permanently injured through accidents. One member reported that it is impossible to estimate the loss as it sometimes means an experiment of months trying out men before the right one is found, and that a new man's weakness might not be discovered for six months, or a year; another member reported that it cost his company $300 per man to train satisfactorily a new one for the job, and still another stated that the cost was $35 for "breaking-in" new men.

OTHER FEATURES.—Short addresses were made by the chairmen of the Membership Committee and the Programme Committee about the plans for the future. Two moving pictures were shown, "The Man He Might Have Been" and another entitled "The Manufacture of Paper, Showing the Entire Process from Cutting the Trees in the Forest to Selling the Newspapers on the Streets."

## GRAND RAPIDS SAFETY COUNCIL NO. 13.

MEETING December 2, Grand Rapids Chamber of Commerce Auditorium; 85 members present.

E. K. Prichett, president, acted as chairman; E. A. Meves, secretary. Arthur H. Young, Supervisor of Labor and Safety of the South Works of the Illinois Steel Company, outlined the organization for safety at this plant. Copies of this paper can be secured upon application at headquarters of the National Safety Council. The following items of interest were developed in the discussion which followed Mr. Young's address:

AMERICAN SEATING COMPANY.—This company reported that its safety organization is made up as follows: A Central Safety Committee of eight heads of departments. Committee meets once a week. A prize of $5 is awarded each month for the best safety suggestion. Printed forms asking for safety suggestions are attached to employes' pay slips. A scoreboard is used to show competitively standing of various departments, and is placed at entrance to plant. This board is worked out on the plan of a baseball score board, each department starting with a credit of 1000 per cent. At the end of each month the total number of man-hours for each department is computed. If there are any accidents which result in workmen being absent from their duties, the lost time is subtracted from the total number of man-hours, thus giving the percentage figures. Accidents not reported within 18 hours, except Sundays and holidays, count double for lost time. Before the Safety Committee was organized in October, 1913, the record was 14.7 accidents per month; this figure has now been cut to 5.9 per month.

EXCELSIOR WRAPPER COMPANY.—Employs 100 men. A Central Committee was organized in March, 1914, consisting of superintendent as chairman and the foreman of each department, and sub-committees of two to three workmen in each department. Committees changed every month. Sub-committees report suggestions to foreman of department. Any employe can make suggestions. The Central Committee passes upon suggestions made by sub-committees, and those accepted are ordered installed. The engineer of the plant is the safety inspector. Accidents have been reduced 50 per cent.

VALUE OF BULLETINS AND BULLETIN BOARDS.—One member reported that a workman using a miter saw scoffed at suggestions for safeguarding, and after he saw posters of the National Safety Council posted upon bulletin boards bearing directly an this subject, he placed a suggestion in "suggestion box" asking that a suitable guard be provided. It was further stated that the promotion of safety in this plant depends entirely on the activities of the Central Safety Committee and the enthusiasm they work into the men.

SAFETY EDUCATION.—Another member suggested that safety education should start in the manual training departments of public schools.

STEREOPTICON SLIDES. — Exhibition showing modern types of safeguards.

# ORGANIZED ACCIDENT PREVENTION

## PRACTICAL INSTANCES OF WORKING METHODS AND RESULTS OF SEVERAL COMPANIES

*By C. W. Price, Assistant to the Industrial Commission, State of Wisconsin, and Member of Executive Committee, National Safety Council.*

DURING the last five years, the manufacturing concerns which have been pioneers in the safety movement have demonstrated that it is possible to eliminate 75 per cent of the deaths and serious accidents, and to reduce the number of days lost on account of injury at least one-half. The safety movement in its present organized form is so new, being only six or eight years old, that it is only recently that any reliable data has been available showing what has been accomplished in reducing accidents and what it is possible to accomplish. I recently received a blueprint from the United States Steel Corporation, showing that during the seven years since 1906 and reaching down to the end of 1913, this corporation has saved 11,074 men from either being killed or seriously injured. An injury is classed as serious when some member is lost or when over 35 days of time is lost. The significance of these figures is revealed when you say that this represents a city of 50,000 men, women and children, in which city the head of every home has been saved either from death or serious injury.

The United States Steel Corporation was the pioneer in the present organized accident prevention movement and has without question made the largest contribution to the cause, not only in showing what it is possible to accomplish, but more important still, in demonstrating the most efficient methods of promoting safety.

The Illinois Steel Company, which is a subsidiary company of the United States Steel Corporation, has been the leader of the safety movement in the Central West. In 1906 this company reports that 43 per cent of its employes were injured and lost over one day of time. The record for 1912 shows that 12 per cent of the employes were injured and lost over one day of time. Since 1900, a reduction of 70 per cent has been made in deaths and serious injuries.

The Wisconsin Steel Company, which is a subsidiary company of the International Harvester Company, has made a reduction of 68 per cent in accident since 1910. Very remarkable reductions have been made in accidents in all of the plants of the International Harvester Company. The Eastman Kodak Company, during the last two years, has reduced accidents 49 per cent. The Packard Motor Company of Detroit has made a reduction of 60 per cent in accidents during the last two years. The Pullman Company of Chicago in January, 1913, averaged 48 minutes lost time on account of accidents for each employe, while in May, 1914, the average was 14 minutes lost time per employe.

### BIG REDUCTION IN WISCONSIN ACCIDENTS.

A recent survey of the records of the Wisconsin Industrial Commission reveals the fact that out of 245 industries in the State employing 200 or more employes, 219 have reduced the time lost on account of accidents so that the average during the year ending July 1, 1914, has been less than one day per employe per year. This means a cost of less than 30 cents on a $100 payroll, for compensation and medical service. The significance of this figure can be appreciated when we consider that the average insurance premium in the State is now $2.72 per $100 payroll.

The Fairbanks-Morse Manufacturing Company of Beloit since 1906 has reduced the number of days lost on account of accidents over 72 per cent. The Bucyrus Company, Milwaukee, since 1911 has made a reduction of 46 per cent in accidents. A. J. Lindemann & Hoverson Co., manufacturers of stoves in Milwaukee, have during the last two years made a reduction in the number of days for which compensation was paid, of over 65 per cent. The Milwaukee Coke & Gas Company, which is nearly as hazardous an industry as the

steel industry, has reduced the cost of compensation in 1914 over 1913 about 65 per cent. The Consolidated Water Power & Paper Company of Grand Rapids, Wis., began a vigorous safety campaign some eight months ago. Instead of talking about reducing accidents they adopted the motto "No Accidents." Their record for the first three months of the campaign was three slight injuries, whereas before the campaign began they had averaged from eight to twelve injuries during the corresponding period.

One of the most remarkable stories in the history of accident prevention in the United States is the story of what the great railroads of this country have done. Four years ago the Chicago & Northwestern Railroad began to work out an efficient safety organization. During the four years they have reduced deaths to employes about 35 per cent and injuries to employes over 25 per cent. As a result of this remarkable record since the Chicago & Northwestern road began its work every great railroad in the United States has taken up safety work and is now promoting it in an organized and efficient manner and remarkable results are being secured all over the country. This includes 200,000 miles out of a total of 245,000 miles of railroad. The "Frisco" road reports that during the first 11 months of its safety campaign it reduced deaths 33 per cent and injuries 27 per cent. The records of the New York Central lines reveal the fact that a reduction of 37 per cent has been made in deaths from accidents comparing 1914 with 1912. A recent report of the El Paso Southwestern System states that during the fiscal year ending June 30, 1914, the decrease in fatal accidents was 41⅔ per cent and the decrease in injuries that caused a loss of more than three days of time was 32 per cent.

Out of the five years' experience in the various industries which have made the largest reductions in accidents has come this striking fact which is agreed to by practically all of the safety experts: that not more than one-third of the reductions which have actually been made have been accomplished or could have been accomplished by the use of any mechanical safeguards or any mechanical equipment, while two-thirds of the reductions have been accomplished largely through organization and through education, in short, through reaching the workmen and securing their co-operation.

### TWO-THIRDS OF ACCIDENTS PREVENTABLE BY CAREFULNESS ONLY.

The statistical department of the Industrial Commission of Wisconsin has made a chart showing causes of accidents in industries of the State. This chart shows 7,908 accidents causing disability of over seven days which occurred from September 1, 1911, to November 1, 1912, a period of 13 months. Of these accidents, 2,511 occurred on machines and machine parts, that is, at points, let us say, where it might be possible in the majority of cases to use some sort of a mechanical guard to prevent the accident, 5,397 out of the 7,908 accidents occurred in ways where it is practically impossible to use any kind of a mechanical safeguard. A large number of accidents were caused by hot metals. Another group of accidents was caused by men being hit by chips, by hoisted and moved objects, by objects falling from piles, etc. Another large group of accidents came under the head of falls down stairs, falls from ladders, falls into excavations, etc. Slipping and stumbling caused many accidents. A considerable number of men were injured in handling various heavy objects and in dropping heavy objects. The largest number of injuries was caused by handling various kinds of tools. The experience of all men who have studied accident prevention emphasizes the point that accidents similar to these 5,397 accidents can be prevented only by reaching the workmen on the job, by instructing them in regard to how accidents happen and the part that they must do in their prevention, a part which is beyond the power of the employer to do. This can only be accomplished by giving the workmen an active part in the promotion of safety.

I do not need to dwell upon the importance of building safeguards to cover various points of danger on machines. Practically all manufacturers are now

familiar with this phase of safety work and appreciate its importance. In Wisconsin, for instance, during the last two years there have been more guards built by the manufacturers than during any previous five years in the history of the State. Already we are beginning to realize results. In September, 1911, 35 per cent of all the accidents were caused on machines or machine parts. In June, 1914, less than 19 per cent of all the accidents were caused on machine parts. This shows a reduction in machine accidents of 45 per cent during less than three years.

It goes without saying that unless the employer has done considerable work along the line of guarding points of danger with mechanical guards he is in no position to ask his workmen to cooperate in promoting safety. He must first show in some tangible form his own good intentions by spending money and doing what he can to protect the men. The experience of the companies which have done the most systematic work in accident prevention has demonstrated that practically every point of danger on machines can be covered with a simple and efficient guard which will prevent the operator from being accidentally injured, and which will not interfere with the operation of the machine. The experience of these companies has revealed the fact that practically all of the best guards are simple, inexpensive, and have been designed and made by experienced foremen and machinists who are close to the work and who can design guards which can be easily adapted to the situation.

GREAT DANGER OFTEN CENTERS ON APPARENTLY HARMLESS OBJECTS.

Our study of accidents in Wisconsin has brought home to us in a most striking way how, until recently, serious accidents and deaths were occurring nearly every day, which might have been prevented by some simple and inexpensive guard. For instance, one manufacturer protested to the commission against an order requiring that a setscrew be removed or covered on a line shaft 10 feet from the floor. The commission replied that the records show that accidents do happen at such points, but before the letter reached the man, or at least before he reached the setscrew, one of his best workmen was caught on this same setscrew and whipped to death. An expenditure of 25 cents would easily have made that accident impossible. Recently a boy in one of the factories went up a ladder leading to a platform and walked across the platform, which was dark, and ran into a large belt and was whipped around the pulley and killed. Three or four old fence boards nailed together and placed in front of the belt would have prevented this accident. This crude guard would have cost almost nothing except a few minutes of time.

Some time ago one of the deputies of the commission visited a plant having a large foundry. The manager stated that on that day he had 30 men laid off on account of burned feet. The deputy recommended that the manager adopt the plan, which had worked out so successfully in many other plants, of purchasing foundrymen's shoes and selling them to the molders at cost. The manager at once followed the suggestion and at the end of six months reported that a reduction of 85 per cent had been made in burns in the foundry. I might go on to enumerate dozens of similar accidents but it is unnecessary. Every manufacturer who has made a study of accidents in his plant is fully alive to the necessity of covering every point of danger with a guard where it is possible to protect the workmen by such guard. But when every such point which can be covered by a guard has been covered, then only one-third of the hazard has been taken care of, while two-thirds still remains to be provided for by reaching The Men On The Job.

At the 1913 Congress of the National Safety Council, which met in New York, I had the privilege of spending three days with some 150 expert safety men in a series of round table discussions. The principal subject discussed was how to reach the workmen and really interest them in doing their part to prevent accidents. I found that practically all of the men who had had the widest experience agreed on the essential points regarding the ways and means of working

out a safety organization in a plant and of reaching the workmen. The following are the features of safety organization work which all agreed are indispensable.

### WHAT IS NEEDED TO RENDER A FACTORY SAFE.

1. It goes without saying that the men at the top—the owner of the business and the manager—must be in sympathy with the movement and must get back of it, and as stated before, must have convinced the workmen of their own good intentions by visible and tangible signs.

2. The next step is to appoint what may be called a central committee or a plant committee, composed of the superintendent as chairman and four or five of the high-grade foremen in whom the owner of the business has confidence and in whom the foremen and workmen have confidence. The general management of the safety work is placed in the hands of this committee and all important matters are referred to it for decision.

3. Practically all plants which have done efficient safety work have found it practical to appoint one man as safety inspector. In large plants this man gives his entire time to the work. In smaller plants he may give only a few hours each day. The safety inspector acts as the secretary of the central committee, makes inspections and looks after all the details of reports and inspection and keeps in touch with the various committees in the shop. In other words, he attends to the details which busy superintendents and foremen cannot and will not attend to.

4. It has been found indispensable to have each foreman make an inspection of his department, say once a month, and submit to the central committee a written report regarding the condition. This plan places a certain definite responsibility upon each foreman and gives him an active part in the safety campaign. Unless he is given a definite part to do he is apt not to take an active interest. The reports of the foremen also furnish the central committee with many valuable suggestions.

5. In the majority of plants the superintendent holds a meeting with his foremen at least once a month for the consideration of safety matters. The superintendent presides at these meetings and the safety inspector acts as secretary. The serious accidents which have occurred during the month are gone over carefully and ways and means are suggested for the prevention of their recurrence. A very important and fruitful subject for discussion is the ways and means of reaching the workmen. It is always found that certain foremen are more successful along this line than others and their suggestions serve to help and encourage the backward members. One superintendent told me that in one hour's time each month spent with his foremen in these meetings he was able to do more to line them up and keep them interested and enthusiastic than by going to them individually every day in the month.

6. By far the most important feature of organized safety work has been workmen's inspecting committees. In each department, three rank-and-file workmen are usually appointed to serve two or three months and are authorized and encouraged to make a thorough inspection of their department once a week, or at least once a month. In many plants they also investigate serious accidents. The reports of these committees should always be made in writing and should be sent to their immediate foremen. The foremen attend to the majority of the suggestions, because they usually cover minor points of danger, and especially points of careless practice. A complete report with the points which have been attended to checked off is then sent to the central committee for its consideration.

### WORKMEN'S COMMITTEES HAND IN VALUABLE SUGGESTIONS.

I have made a careful investigation of a number of plants in which workmen's committees have been appointed and in every case they have been successful, and a surprising awakening of interest among the workmen has immediately resulted. When workmen are given responsibility and an active part to do, they feel that they have been recognized and they at once take a new interest and a

new attitude towards safety work. The experience of all factories with which I am familiar reveals the fact that from 90 to 95 per cent of the suggestions which these workmen's committees make are practical and are accepted by the company. As the work progresses, the workmen's committees more and more report cases of carelessness and ignorance on the part of the workmen, and report less and less points of danger to be covered with guards. The 800 workmen serving on the committees of the Chicago & Northwestern Railroad during the first three years of the safety work reported more than 6,000 points of danger. All but about 200 of these suggestions were found to be practical and were accepted by the officers of the company.

WORK ON COMMITTEES CONVERTS MEN TO THE SAFETY CREED.

In the work of inspecting their departments and investigating accidents the workmen on these committees learn what the superintendent and foremen cannot tell them and make them believe, namely, that two-thirds of the accidents are beyond the power of the employer or the foremen to prevent, and must be prevented by the active co-operation of the workmen. When the workmen on these committees become interested and become informed in regard to the causes of accidents, through their experience they become the best teachers and boosters in safety among the workmen and can do more to convince the workmen of the honest attitude of the employer and especially in regard to the obligation of the workmen than anything which the foremen can say.

In organizing a small plant, say of 50 to 200 employes, the same fundamental principles apply as have been outlined for a large plant. While the features of the plan which include the superintendent and foremen may be simplified, and in some cases should be simplified, the committees of workmen are the one indispensable feature which should be retained. A small plant can be organized in exactly the same way and just as successfully as one department in a large plant.

The instruction of workmen, especially of new men and non-English speaking men, in regard to danger is made a very prominent feature of the safety work. So important is this considered that in some of the larger companies which employ a large number of non-English speaking men an interpreter is employed who devotes his whole time to going among the men and talking to them in regard to what the company is doing to protect the men, the part which the workmen are doing and the danger of the particular work which the man is about to take up. In this work of instruction books of rules, signs, shop bulletins, safety buttons, moving pictures and calendars in the home have all been found valuable in keeping the safety idea uppermost in the minds of the workmen and in instructing them in regard to what they can do to protect themselves.

The use of bulletin boards has been found to be one of the simplest means of keeping the idea of safety before the men. These bulletin boards are located in all the principal departments and fresh material is posted each week, and sometimes each day. Materials include such things as clippings from newspapers, photographs of men who have been injured, comparative records of accidents in various departments, descriptions of accidents, etc.

SMALL GIFTS, REMINDERS OF SAFETY, PROVE EFFECTIVE.

The Illinois Steel Company has adopted the plan in all of its plants of giving some small token, such as a watch charm or pocket comb, to each workman in a department in which no accident has occurred which causes a disability of over a certain number of days. This plan has brought surprising results because the workmen feel that they have been recognized and rewarded for the part which they had in making the record which they established for the department.

The introduction of a safety organization into a plant does not mean the addition of more red tape or the imposition of a cumbersome system which will become a burden, but it means just what a manufacturing organization means—a systematic and orderly way of taking care of a difficult problem which has

heretofore not been taken care of in a thoroughgoing and systematic manner. It means that a new force has been introduced into the plant which will keep up the interest and enthusiasm.

During the past year a large number of industries in Wisconsin have worked out safety organizations and in every case there has resulted an immediate awakening of interest and a reduction of accidents within the first few months. One of the most encouraging features of this whole campaign of organized safety work is that when once a manufacturer organizes his plant and secures the active co-operation of his workmen he is so pleased with the results that he never goes back to the old methods but goes forward with increasing interest.

I think the rapid progress which the safety movement is now making in the United States is largely attributable to the fact that the manufacturers are learning of the splendid results which have been secured in various plants by systematic efforts and are becoming familiar with the details of safety organization. In every plant with which I am familiar where systematic safety work has been done, it has always resulted in an improved manufacturing organization and in every case has resulted in a very substantial saving in money. Judging from my investigations I should say that any company which will properly organize and promote safety may realize a dividend of at least 25 per cent on the money invested. I know of plants which are realizing 50 per cent on the investment.

The present safety movement can only be understood when it is considered as a part of the general efficiency movement which is now attracting such wide attention among manufacturers all over the country. It goes without saying that most manufacturers are humanitarian in their attitude towards their workmen and do not wish to see them killed or injured, but if combined with this feeling there goes the realization that good safety work turns out to be good business organization, we then have two powerful motives which combined give certain assurance that within a few years a large percentage of the manufacturing concerns in the United States will be doing efficient safety work and very large reductions will be made in the number of men, women and children who are killed and injured.

# SAFETY FROM THE VIEWPOINT OF THE WORKMAN

## EMPLOYES REALIZE ITS MATERIAL AND MORAL ADVANTAGES AND ENDEAVOR TO BECOME SAFE

*By George Shepherd, of South Works, Illinois Steel Company.*

WHEN the "Safety First" movement was started in the South Works under the pioneership of R. J. Young, we workmen in the mill regarded the move as pertinent to the office alone; as something, in fact, in which the workmen had no interest. We deemed it one of the various precautions taken by the company from time to time to curtail the expenses necessarily attendant upon accidents; consequently, our attitude toward the movement was one of indifference.

The representative of the movement who worked among the men was not chosen from our numbers, and therefore was looked upon with more or less misapprehension and distrust. When he appeared and plied us with questions regarding necessary precautions against accidents, we often wondered among ourselves—and expressed that wonder freely—whether he was really concerned in our welfare or interested in acquiring information about the workmen that might be beneficial to the company.

When later the appointments of members of the safety committees were made from among the officials of our own department, men in whom we had perfect confidence and who we knew had our interests at heart, our attitude began to change from that of indifference to one

of awakened interest. It may easily be imagined how much keener this interest became when men from our own ranks were asked to represent us on these safety committees.

I well remember the first committee on which I was appointed. We entered so vigorously into the spirit of the movement that we recommend about 150 items for safeguards and improvements. We were so ardent upon our mission that we failed to realize the impossibility of installing those recommendations in the brief lapse of time between committee meetings and were greatly disappointed because at the end of the month all our suggestions had not materialized.

These safety committees, being composed of both officials and workingmen, serve a double purpose. The official acts as a check upon recommendations by workmen that may not be practical. The workingman brings to the committee suggestions of precautions that escape the official's notice because he is not brought into personal contact with the demand as is the workingman himself.

The appointment of workmen upon the committees has encouraged a degree of confidence and responsibility among them, impossible of existence when a committee is chosen of officials alone. Every man in the entire department feels free to report to his representative any infringement upon safety rules by a fellow workman, any carelessness or any lack of appreciation of the importance of necessary precautions. Were he to make these same reports to an official, he might feel that he were registering a complaint against his co-worker. The workman reported might also be antagonized, for he would feel that a report to an official direct carried with it a certain amount of censure.

### SUCCESS OF COMMITTEE DEPENDS ON ITS PERSONNEL.

The choice of the committee is important, for the success of the whole movement depends entirely upon the personnel of said committee. Men who are heart and soul in the movement are the men for the work; not those who are seeking companions to whom to confide either real or imaginary troubles, not those who look upon this appointment as an opportunity to kill time, not the pessimistic workman who journeys through life carrying his own individual grouch. This is not the place for these types of workmen. The man who is needed is the one who loses consciousness of self entirely; who appreciates the opportunity offered for the betterment of the working conditions of his fellow workmen, and who does his best to influence the men to realize that the company is expending money for their welfare and safety.

### FACTORY WORKERS TAKE A BIG INTEREST IN THE SAFETY WORK.

That our present system is proving a success is shown in various ways: First, in the alertness of the men in carrying out the principles of the safety movement. Each man is anxious to work for safety and awaits eagerly the coming of inspection day, upon which the committee makes its trip through the works and consults with the workman upon any suggestions for bettering conditions which he may wish to make.

If a man sees a fellow workman violating a safety rule or taking a chance, he warns him of his danger at once. When a man is chipping without his goggles, two out of every three men passing say: "Where are your goggles?" If a workman uses a battered chisel from which pieces are liable to fly, he is cautioned by those who see him. Should he persist in this infringement of the "Safety First" rules, he is reported to his foreman. To avoid report, after knowing that his lack of precaution has attracted attention, he is quite anxious to obtain perfect tools for his work.

Here is an incident that came to my personal notice.

A man whom I did not know was attempting to cross a train blocking a railroad crossing, whereupon a man said to him: "Being a member of the safety committee, I must warn you of 'Safety First.'" He took the advice, and like the rest of us, waited till the crossing was clear.

To cite another incident, there was a breakdown in the Blooming mill. A machinist wishing to cross the table,

took the precaution to shut off the steam of the table engine. This act was not known to the men among whom he worked. As he crossed the table, three men in chorus shouted: "Look at that fellow crossing that table!"

Many more incidents could be cited, but these few suffice to show that the men are interested, and so alert.

Let us consider the light in which we men view accidents. In the early days, before we had the numerous safeguards which have followed the "Safety First" movement, the men were expected to be cautious and careful, but no censure or stigma attached itself to an accident. Now, both follow upon the greater percentage of accidents; for statistics show that 70 per cent of the accidents that do take place, are still the direct result of carelessness, as opposed to 8 per cent that are unavoidable. We men feel the disgrace attendant upon an accident caused by carelessness as keenly as we do a mistake or neglectful act in the performance of our work.

STIGMA FROM CARELESSNESS DREADED BY THE MEN.

The stigma resulting from carelessness clings to the official as well as the men. The other day an official of one of the departments jumped off a pile of bricks and ran a nail into his foot. He was reprimanded by his superior, and, as I have been informed, felt it keenly.

We are aiming to so stigmatize accidents resulting from carelessness that in the near future we hope to transpose the ratios so that accidents from carelessness may read 8 per cent rather than 70 per cent.

The rate of accidents is decreasing continually. In 1906 the percentage of "lost time" accidents in my department was in the neighborhood of 30 per cent; in the first 10 months of 1914, the percentage was between 6 and 7 per cent. This gives some idea of the gradual decrease in the number of accidents.

In addition to the regular safeguards and precautions, such as railings, guards, lights, etc., we have books of instruction printed in the various languages, and it is the duty of each foreman to see that the men under him are provided with a copy of the same. Then the safety button has acted as a great impetus. Before a man can obtain one of these he is obliged to pass an examination on safety. A later incentive has been offered in the form of a watch fob, which shows a higher standing in the examination. The applicant must make a grade of 90 per cent. It is interesting, in passing through the works, to note the great number of workmen who have been successful in obtaining these symbols of efficiency.

And now, in conclusion, let me say that we workingmen feel that the "Safety First" movement is a great boon to the workingmen, and we are confident that its influence will extend beyond our immediate sphere and eventually render a blessing to all humanity.

## MINING ACCIDENTS.

Edwin Higgins in the Miners' Circular 17 on "Accidents from Falls of Rock or Ore" says: "More men are killed and injured in the metal mines of the United States from falls of rock or ore than from any other cause. According to figures published by the Bureau of Mines in Technical Paper 61, there were employed in and about metal mines during the calendar year 1912 a total of 169,199 men. Of this number 110,056 worked underground and 59,143 under surface. There were 661 fatal accidents, 522 underground, and 139 on the surface. Of the fatal accidents, 212 were caused by falls of rock or ore, this number representing 32.1 per cent of the total number of men killed on the surface and underground, and 40.6 per cent of the number killed on the ground."

## SAFETY IN SCOTLAND.

A feature of the broad campaign for safety recently instituted by the management of the Corporation of Tramways of Glasgow is the rewarding of drivers and conductors in proportion to the immunity from accidents afforded to passengers throughout the year. This plan is showing excellent results, greater attention being paid to the convenience and safety of persons getting on and off cars and to the avoidance of traffic accidents.

# SCAFFOLDS AND LADDERS

## ACCIDENT PREVENTION IN BUILDING CONSTRUCTION

*By A. E. Davidson*

[Abstract of a paper read by Mr. Davidson at the Second International Exposition of Safety and Sanitation.]

I HAVE here a book in which I collected, during a number of years, newspaper clippings giving accounts of accidents from scaffolds. The headings are all very much alike. The book contains a record of 350 accidents from scaffolds. It shows that more than 140 men were killed, and more than 450 injured because some part of the scaffolding upon which they were working gave away. Yet this is a small percentage of the accidents that actually happened during that period.

I shall attempt to set forth what in my judgment are the three chief defects and dangers in the present practice.

1. The primary and underlying fault is that the scaffolding of a building has been deemed of little importance.

2. There is a general lack of the "Safety First" idea both among the employers and the workers in the building trades.

3. There is no standard system of building a scaffolding.

Let us investigate these three points more fully.

As to the first contention, that the scaffolding of a building is considered of little importance, we find an abundance of evidence to support it. There has grown up the idea that anyone can build a scaffold. That since it is to be merely a temporary structure it does not justify any great expenditure of time, thought or money. Hence, it has become the custom to delegate this important work to the laborers of the different trades. Likewise, among the men who work on the scaffold the same idea prevails. The danger in such a way of thinking and in intrusting this work to the common laborer is obvious.

Next we come to the second point, that there is a general lack of the "Safety First" idea among the employers and employes in the building trades. One needs but to spend a day visiting a few typical jobs to satisfy himself as to the truth of this contention. The mania for speed often leads the superintendents and those who direct the work to put speed before safety. They ask their men to take risks out of all proportion to the expected gain. I could cite numerous instances where this has resulted disastrously.

Should any of you make an inspection trip, you would find a lack of adequate protection for the public around many jobs. We will all agree that the public should be well protected, but I will mention one piece of work now going on under the specifications of our Government officials to show that safety gets little thought. The repairs to the Post Office Building in New York City, at Park Row and Broadway, consist in removing heavy ornamental cast-iron plates from the upper sections and from the great dome and replacing them with copper ones. To reach the location of this work, scaffolding was required, and bids ran from $1,800 to $5,000 for the scaffolding. Of course, the man who submitted the high bid did not get the contract. The highest bid, however, provided safety for the workmen and the many thousands of people passing in and about the building each day. For two months this work has gone on high over our city streets with no protection bridge over the sidewalk, with scaffolding just sufficient for the workmen to reach their work. When passing that way I walk on the other side of the street. No doubt many others do the same.

Many cities and towns that I have visited seemed to have left the matter of protecting the public very much to the discretion of the individual contractor. Each man is permitted to build according to his own specifications, with the result that in many instances, according to my observations, proper protection is not assured.

Do not conclude from my remarks that I believe all jobs to be carried on with little regard for life and limb, that

I think that all builders conduct their operations heedless of protection for their workmen and the public. Not at all.

The conscientious general contractor is trying to make things safe, but he is in competition with the man who sees only the commercial side, who figures how he can get his work done at the least possible expense—that the purchase price of every plank withheld from a protection shed is so much profit to himself.

The third point, lack of system, is proven by the fact that the scaffolding of a job has been left to the individual ideas of the man doing the work. "Get us up to the work and get us up cheap," is ever the cry. If the skilled man cannot do it as cheaply as the laborers, he does not get the job.

Thirty years ago the system for the bricklayers was to build a rough pole scaffold lashed together with ropes. Today it is a timber scaffold for the wall-bearing jobs, and for the high steel frames a platform suspended by steel cables and operated by a patented device.

Now as to the remedy. The architect should give more attention to the scaffolding of a job, and the engineer should see to it that proper material is used and that the men employed are competent to do the work. The superintendent in charge of the construction should demand co-operation, and see to it that, when several classes of work are to be done from the one scaffold, the scaffold is built strong enough in the first place to sustain the greatest load to be put upon it. If swinging platforms are used, they should be of the most rigid sort and subject to regular inspection. The painter's equipment of manila ropes should be run through a testing machine every six months, and oftener if there is any danger of acid getting on them. The men constructing and erecting all scaffolding should be made to feel that their business is most important, as the lives of many men depend on how they do their work.

The ladders on a job should have more attention. Where records are kept they show a ladder to be one of the most dangerous things in the world. I spent a day in Harrisburg a short time ago with a committee appointed by the State of Pennsylvania to standardize ladders in the trades. They are giving a great deal of thought to the best specification to recommend, and I believe they will do a great deal of good to the man and to the employer when they decide on a standard. The extra cost will be very small compared with the good results they will produce in increased efficiency of the workmen.

A man cannot do his best work unless he feels secure. And in these days of short hours and high wages everything that hinders the man counts against the conduct of the work. With the workmen's compensation coming in every State, the employers will welcome anything that will reduce the accident list.

"What is everybody's business is nobody's business," is an old saying, and it has proven true in scaffolding work. Anybody was supposed to be able to do it, but at what a cost of life and limb we are just beginning to find out!

Remember that from the laborer who handles the material to the great artist who adorns the wall and ceiling with his masterpieces, and the hundreds of thousands of men that ply their trade between, all are operating from scaffolds during a great part of their working life, and they should be made safe. It is possible to make them safe and cut the accident list in half at once by the simple method of changing from an unsafe system to a safe system and by insisting on safe practices by all. That means having good general specifications to work by and proper inspections to see that the specifications are enforced.

## ELECTRICAL RULES.

The Wichita Falls Electric Company has drawn up a number of rules for its men, including the following:

When operating the switchboard always stand on the rubber mat.

When throwing the switches use but one hand.

Keep instruments and wiring all clean.

Report all trouble on station log.

Use rubber gloves in handling all wires. They may be alive.

# ACCIDENT PREVENTION IN COPPER MINING

## A SAFETY CAMPAIGN WHICH BROUGHT RESULTS

*By Wallace McKeehan, Safety Inspector, Copper Queen Consolidated Mining Company*

THE safety organization of the Copper Queen Consolidated Mining Company, having completed its initial year, I have thought it advisable that a record should be made and published, of the work performed, with a list of accidents had and their classification. This will be useful in the future for comparative purposes.

With the view of forming an organization to carry on the work of accident prevention, rescue, first aid and welfare of employes, the General Manager, in the summer of 1913, appointed a committee of officials and employes to draw up a plan of the organization and also to compile a book of rules. After the completion of the committee's work it was continued as the central safety committee.

About this time the company erected what is known as the rescue station. This building is centrally located as regards the company's operations and is used as an office by the safety department. As all of the rescue equipment and supplies are kept here, and also some of the first-aid, it is used as a headquarters for this work, although most of the training is given elsewhere.

When this department was organized no like organization was in existence among the mining companies of the Southwest and but few metal mining concerns in the United States had safety departments, the ones that had done the most being located in the iron mining districts. While nearly all railroads had carried on the work successfully and large industrial corporations, especially those in the iron and steel trade, and many coal operators, had done the same, not much of the work done by them was of value to those engaged in copper mining, as the conditions were radically different.

Shortly after the appointment of the writer as safety inspector he was sent to various coal and iron mining districts and to the plants of the steel corporation. He also conferred with the officials of the Bureau of Mines, in Pittsburgh, and attended the meeting of the American Mine Safety Association and the Rescue and First-Aid Contests given by the association and the Bureau of Mines. The Museum of Safety in New York, and the offices and display rooms of the Red Cross Society in Washington were also visited. As much information as possible was gathered that would prove of value to us in our work here. Several months were needed to gather the desired information and perfect the organization, the details of the work having to be arranged to suit local conditions.

Bulletin boards were placed at points where the men congregate. Around the works they were put up near the shaft collars, at change houses and timekeepers' and employment offices. Down town, at the Y. M. C. A., Public Library and the company's dispensary. Upon these are posted the monthly accident reports and the bulletins commenting upon the same; photographs of dangerous practices and of right and wrong methods of doing the work; bulletins descriptive of all fatal and some of the serious accidents with a statement as to how these might have been avoided; and any printed matter or photographs that will aid us in our work of accident prevention. Either upon or near these boards is placed a box containing post cards that may be used by employes in sending safety suggestions, and another box which is kept locked, where these cards may be placed and at fixed intervals they are collected by the chairmen of the subcommittees and are read and discussed at the meeting of the committee from that division or department.

Safety mottoes printed on heavy cardboard were nailed up in conspicuous places, both underground and on the surface.

A campaign was started to secure the co-operation of all employes. Particular stress was laid upon the value of

safety suggestions sent in by the men. That this was effective may be seen from the number of suggestions received about 150 having been sent in during the 12 months, 50 per cent. of these being accepted by the management and put into effect, some of which have called for considerable expenditure.

Believing that preventive measures are more to be desired than those of a curative nature, this department has conducted a safety campaign among employes, the object of which is to draw the attention of all to the necessity of preventing accidents.

With the object of having a better get-together spirit among the men a series of safety rallies and smokers was started. To the rallies the men brought their families. Talks were made by the officials and safety inspector on accident prevention and the "Safety First" movement in general. Some of the talks were illustrated by lantern slides of pictures taken in the company's mines and different departments. In addition to our own pictures many were used that were loaned by the Bureau of Mines, showing mine rescue and first aid work. After the serious part of the program was over the balance of the evening was given up to entertainment. At all of the rallies and smokers a good attendance was had and for days after various parts of the program were the subject of conversation among the men. Without a doubt these meetings are of great value.

During this year of organized safety work there have been four fatal accidents, 104 serious accidents, and 2,171 minor or slight injuries, a total of 2,279. While no comparison can be made with the total of previous years, a quite accurate comparison can be made of the fatal accidents and a fairly accurate one made of the serious ones.

Comparing the fatal injuries with those of like periods we find a reduction of about 55 per cent. The serious ones were reduced about 40 per cent, and without doubt a large reduction has been made in minor accidents. That this reduction is largely due to the work of the safety organization and its committees no one can seriously doubt.

We had an average of 190 accidents per month, or 7½ for each working day. Of the total number 33 might have been prevented by additional precautions on the part of the company, 1,572 by the injured employes and 134 by fellow employes. Two hundred thirty-three occurred while the injured employe was breaking the company's rules. Five hundred and one accidents were classed as trade risks; in other words, 22 per cent of the total were considered unavoidable. The trade risk classification brings to notice the fact that 75 per cent of all accidents might have been prevented.

One hundred and sixty men were hurt at chutes; 96 by ordinary falls; 187 by mine cars; 298 while using tools, and 152 suffered from strains and sprains. From falls of ground 524 accidents occurred, 4 of these being fatal and 32 serious. Twenty-seven per cent of these were trade risks. Twenty-three per cent of all injuries received were due to "falls." No fatal accident occurred from any other cause.

In 669 cases, or 40 per cent, there was no loss of time.

Since we started keeping a record of men who have received first aid treatment, 23 per cent received treatment before leaving their places of employment. This percentage should increase rapidly from now on.

One hundred and sixty men were hurt while working at chutes; 96 by ordinary falls; 187 while using mine cars; 298 by tools, and 152 received strains and sprains. Lay-offs from the last cause have been steadily increasing. When a man has suffered a sprain of any kind, no one, be he doctor or layman, can say for sure how badly he may be injured. I have a hunch that quite a few men put one over on the doctors when complaining of injuries of this kind.

The mine rescue work has been systematized and as much as local conditions will allow has been conducted along the lines proposed by the Federal Bureau of Mines.

Our Draeger oxygen apparatuses are at all times kept in the best possible condition. Some changes have been

made to suit our conditions, chief among which are heavy glass windows in place of mica ones. Wide leather straps padded with sheepskin are used in place of narrow ones, it being found that the men could not stand the weight of the apparatus if the narrow straps were used and the apparatus worn for any length of time.

While the very best type of oxygen apparatus is far from being ideal, still with proper care, it is very efficient. In this climate, rubber and leather parts soon deteriorate, especially the rubber gaskets and breathing bags. One of the best means of preserving both is to give them as much use as possible.

Men selected for mine rescue work must pass a physical examination, be above the average in intelligence and thoroughly acquainted with all kinds of mine work. Wherever possible select single men, as the work in the apparatus is rather dangerous. We now have 35 men who are thoroughly trained, 17 having certificates from the Bureau of Mines.

Our rescue corps has been called upon for work at El Cumbre Tunnel, in Mexico, where 51 passengers were burned to death; and at the mines of the Cananea Consolidated Copper Company, La Cananea, Mexico, where 16 of our men were constantly employed fighting the fires for seven days, a part of the men remaining for 18 days. Only one fire was had in the company's mines during the year, and it was put out after about 10 hours' work.

Our first aid work was started shortly after that of the mine rescue, but not until an agreement had been made with other large companies operating in the Southwest, so that all would use the same text books, methods and supplies. This arrangement is of value to both companies and employes.

Special first aid cabinets or cans made in the company's shops are supplied to all departments and underground workings.

Five men constitute a team, each team being given the training once a month or when they are on the night shift. For his attendance each man is allowed $1. Some of the teams take so much interest in the work that they meet at each other's homes once a week for practice. First aid training is of value to all concerned. Not only do injured men get treatment when most needed, but men who are well trained, being better acquainted with injuries and how received, will use more care about their work. Statistics prove that not over 25 per cent as many first aid men as others are injured.

## DECREASE OF QUARRY ACCIDENTS.

The number of quarry accidents in the United States in 1913 was 14 per cent. less than during 1912, while the number of men employed had decreased only 6 per cent., according to Technical Paper 92 of the Bureau of Mines, compiled by Albert H. Fay. This booklet classifies the men employed and the accidents by the kinds of quarries in which the men worked. According to this classification the limestone quarry work caused most accidents, namely, 93 during 1913 and 101 during 1912, these figures being in one case 4½ times and in the other 3½ times as high as those for cement rock quarries. Relatively, however, cement rock quarries have the highest death roll namely, 3.17 per mill in 1912 and 2.91 in 1913. During 1912 marble quarries ranked second with 2.63 per mill and trap rock third with 2.42, while in 1913 slate was second with 2.56 per mill and trap rock third with 1.93.

## CLASSIFYING ACCIDENTS.

Preventable accidents (says James B. Douglas, of the United Gas Improvement Company, Philadelphia) may be classified under the following heads:

1. Use of wrong method by the workman.

2. Carelessness by the workman of his own safety and that of his fellow employe.

3. Defective or unguarded machinery, tools, appliances, etc.

The largest number of accidents falls in the first two classes, and of course only care on the part of workmen will reduce the number due to those causes.

# "THE MAN ON THE JOB"

## PRIZES FOR DECEMBER ARTICLES.

*First Prize. No.* 143. *Frank H. Trego, Secretary-Treasurer, Stonehouse Steel Sign Company, Denver, Colo.*

*Second Prize. No.* 144. *W. H. Aldrich, Superintendent, Inspection Department, Southwestern Surety Insurance Company, Denison, Tex.*

*Honorable Mention. No.* 142. *G. M. Mackie, Master Mechanic, Milwaukee Coke & Gas Company, Milwaukee, Wis.*

*Another meritorious article was contributed by C. A. Gilkerson, Secretary, Central Committee on Safety, Public Service Company, Chicago, Ill.*

*Comments by the members of the committee appear on page* 71.

*The names of the members of the committee to award December prizes will be found on page* 72.

*Conditions under which articles are submitted to this department are published on page* 73.

**No. 145** THE GREATEST ACCIDENT REDUCER. — Safety work is the most valuable and interesting work I ever engaged in. It is valuable from two standpoints; first, the humanitarian—it saves men's lives and limbs, and wives' and children's tears; second, the economic—it means a great saving every year in dollars and cents, not only to the employers, but to humanity as a whole. It is interesting because it pertains to something which vitally concerns every person.

The safeguarding of machinery, physical examinations, the providing of safe and sanitary places for the men to work in are very important, but the educating of the workmen to be careful of their own and others' safety is far more important. The human element is the cause of most of the accidents. I believe the use of moving pictures, slides, pictures and bulletins is a good method for educating the men; particularly any form of picture, because it appeals to the eye, and the foreign people are attracted by pictures which tell the story of an accident without the use of words. But the greatest accident reducer is the Safety Examination. When a man is employed he is given a Safety Rule Book. At the expiration of 10 days he is examined by the safety inspector. In the case of a foreigner an interpreter is used and the following questions are generally asked:

Question: Have you read your Rule Book?

Answer: Yes. (Or in case man cannot read:) Somebody else has explained the rules to me.

Q.: When your duties require you to use tools of any kind, what should you do before using the tools?

A.: Carefully examine the same to see if they are in good condition.

Q.: If you notice any unsafe condition, such as a broken stairway, uncovered pit, etc., no matter where it is, what are you supposed to do?

A.: Report it promptly to my foreman.

Q.: Before crossing railroad tracks what are you supposed to do?

A.: Stop, look both ways and listen.

Q.: What is the rule in regard to taking short cuts over dangerous places?

A.: It is forbidden.

Q.: Are you allowed to tamper with or repair electric lamps and wires?

A.: No. This work is done by the electrician.

Q.: When injured, no matter how little, what are you supposed to do?

A.: Tell my foreman at once and go to the doctor.

Q.: What is the danger in neglecting slight injuries?

A.: Might get blood-poisoning.

Q.: What is the rule in regard to riding on engines, cars, cranes or other moving bodies in the plant?

A.: No one is allowed to do so unless required by his duties.

Q.: Before going on or starting to work on an overhead electric crane or other machine what must a man do?

A.: Notify the operator first and put a

safety lock on the safety switch or controlling lever.

Q.: How should pits and excavations be guarded?

A.: Ropes or a fence should be put around them, and at night a red light placed near to warn of danger.

Q.: Do you allow overhead cranes to carry loads over your head?

A.: No. I always get to one side.

Q.: Before going on a scaffold what should you do?

A.: Examine the ropes and see that the scaffold and its supports are properly built, and are in good condition.

Q.: When working on a roof or other high place from which you are liable to slip and fall how should you protect yourself?

A.: Wear a safety line and belt, and do not have the line too long.

Q.: What are the rules in regard to the use of ladders?

A.: Examine the ladder and see that it is in good condition. If there is danger of the ladder slipping, I will have another man hold it for me. I will not carry material in my hands while going up and down ladders, but will have the free use of both hands, and in handling material will use a rope.

Q.: How would you put a fire out in an electric motor or around electrical apparatus?

A.: I would use the dry powder extinquisher or dry dust. I would never use water because it is very dangerous around electrical apparatus and might kill me.

Q.: What is the rule in regard to blowing compressed air on yourself or fellow-workmen?

A.: It is forbidden. The air may enter the body and injure or kill.

Q.: How should you protect yourself when chipping or doing any work where there is danger of eye injury?

A.: Wear safety goggles.

Q.: When you complete an overhead job what are you supposed to do before leaving?

A.: See that all tools are taken down and all loose material and temporary scaffolds removed.

Q.: What should be done after machinery is repaired?

A.: All safeguards should be replaced.

Q.: Before doing any work where there is danger of coming in contact with electric wires or apparatus what rule should you observe?

A.: Notify the chief electrician who will send an experienced man to advise concerning the work.

Q.: What is the rule in regard to smoking and open lights in places where explosives or other inflammable material is used or stored?

A.: It is strictly forbidden.

Q.: Upon the discovery of fire what should be done?

A.: Notify the fire headquarters or the head watchman at once.

Q.: What should be done when any fire extinquisher, fire hose, water from fire barrels, etc., has been used?

A.: Notify my foreman at once so that the proper replacement may be made.

Q.: What is the rule in regard to keeping the plant clean?

A.: Old waste should be put in the proper boxes, and papers and food scraps should be put in the buckets or cans provided for that purpose.

Q.: What would you do if you saw a man doing some dangerous act or violating the safety rules?

A.: I would warn the man of the danger and, if necessary, tell the foreman.

If the man shows a fair understanding of the answers to these questions he is given a safety button and a cigar. He is now a safety booster, and *safety boosters are the greatest accident reducers in the world.*

❦ ❦ ❦

**No. 146** "THINK," THE FIRST SAFETY COMMANDMENT.—A place of work may be in a fine building, clean and well lighted, with machinery guarded, and yet accidents occur. What is the cause? What is the effect? What is the remedy?

Almost every man unconsciously looks after the safety of his fellow workman, but does not stop to think of his own safety. This is a matter that must be brought home to him, that he must not only think of others, but of his own safety.

If the employe sees that his superintendent and foremen are vitally interested in the safety of all employes and they show by their example that the welfare and safety of the men are first considerations of their work, then will the employe think for himself of the dangers that will befall him if he does not observe, obey and act in a proper manner while doing his work.

The greatest lesson for a man is learned by observing the attitude his superior officer takes in regard to the safety of his employes.

Most accidents occur through the momentary neglect or thoughtlessness on the part of the workmen.

We see signs at the railroad crossing: Stop, Look and Listen! To this has been added in red letters across the post: Think! This word sums up the whole situation. It does not take long to think. No time is lost, and what a large number of accidents would be avoided if we only would think.

Machinery is being guarded with all the safeguards which can be placed on it without hampering its efficiency and yet an accident occurs through some safeguard being taken off for repairs and not replaced because someone did not *think*.

We all want to do the right thing, but it must be particularly impressed on the minds of the employes that disaster overtakes the unwary man and distress and suffering falls on himself and his family. Let us impress on the employe that Safety is a precious jewel and not only the man is rewarded, but his dependents are protected by his vigilence.

The place of work should be well lighted and kept clean, material carefully piled, machinery kept in first-class condition, so that it is a pleasure to work in such surroundings.

The interest of the employe is thus secured and necessarily safety predominates over all other considerations.

Rules are laid down for all work and must be obeyed.

Self preservation is the first law of nature; yet we cannot always trust to instinct to warn us of danger, but must avoid accidents by thinking and acting.

**No. 147** How Statistics Help to Prevent Accidents.—How best can accidents be eliminated or reduced in number and severity? To properly answer the question requires a careful study and analysis of accident causes, and this requires data which is largely lacking in American factories. Some of the older countries have far outstripped the United States in *Accident Prevention,* not because of any greater ability or aptitude, but rather from their systematic study of cause and effect. It does not take us long to act if it is plain what we should do. Covering a hole with a board after a man has fallen in is not enough. Why is the hole there? Can it be filled up? If not, we should have a substantial railing around it. Some one forgetting the accident might pick up the board; the railing will stay.

In 1911 we found our company had 150 accidents costing $1,089. We had the money cost, but not the details to investigate causes and provide proper corrections.

Late in 1911 we set about keeping record of our accidents in such a way that we had all the facts, causes, different classes, etc., and at the end of September, 1912, the record showed a total of 143 accidents for the year divided as follows: Foot, 21; eye, 47; hand or finger, 48; scalp or face, 6; burns and scalds, 3; miscellaneous, 18.

In the meantime we set about a careful study of the various accidents, their causes, and how they could be avoided. This was done so successfully that the total cost of accidents for the year ending September 30, 1913, was but $390, and the total time lost on account of accidents had been reduced to 218 days, or less than .1 per cent of the total number of work days.

Another thing we had found was that more accidents could be prevented by educating, instructing and interesting the workers than by any other means.

The following percentages taken from 1913 data is interesting as showing where study should be directed:

| | |
|---|---|
| Accidents preventable by proper safeguards | 4 |
| Due to pure carelessness of employe. | 26 |
| Due to carelessness of fellow workmen | 4 |
| Purely accidental or incident to business | 66 |

In the last class are included all such slight cases as getting dust in the eye, dropping castings on toes, etc.; their number can only be reduced by greater thoughtfulness and care on the employe's part. This we are stimulating by instruction, committee work, and competition prizes, as well as by publicity among the different departments.

**No. 148** A Serious Job.—Under the old system it was with difficulty that an inspector could accomplish the installation of a desired guard. So far as the assured was concerned, it was immaterial to him whether his machine was guarded or not, so long as he was covered by carrying insurance; and it was with extreme difficulty that

the assured could be induced to provide such necessary guards, his argument being that he could not see why he should spend a certain sum of money when it was of no financial interest to himself. In consequence I have most frequently had to deviate from the particular case at issue and draw such serious illustrations as I will present forthwith.

Lo, what changes time has wrought, thanks to the underwriters' standards. They have revised conditions. My experience has taught me that serious pictures drawn to the higher authority will often procure safeguards.

Not a few people, together with some inspectors, consider quite seriously enough the inspector and his duties. There is lots more to an inspector and his position than the mere requesting that certain machines, belts and conditions be guarded. Personally I have been told a great many times that inspectors *had to find* some sort of a complaint, in order that we as inspectors may hold our prestige with our employers, and I have experienced difficulty before I could eradicate such an impression from a mind. Here is where I have had to draw such serious pictures of previous happenings, talk about widows and orphans and explain how all such sorrow could have been avoided, provided the proper safeguard had been thrown around such a condition.

In fact, an efficient inspector should feel within his heart the good he is trying to accomplish and that he is at least doing some good to some one. Serious illustrations drawn will always bring forth a statement from an employer that it is not his desire that any one be injured, and he will eventually agree with you. Inspectors and their duties should be considered most serious, in that these are nobler than a few people surmise. His work is of a humane nature and he personally should feel within his heart that his is a noble duty indeed, that it is for the preservation of happiness which otherwise might be changed to sadness, and last, but not least, the preservation of both life and limb.

Convince the manufacturer of your mutual interest, show him you are serious.

Leave a serious impression. A serious impression sticks.

## COMMENTS BY MEMBERS OF THE COMMITTEE.

The writer of No. 143 has shown by comparison in his wonderfully lucid article, the analogy that exists between the present war in Europe and the industrial war against accident and death in this country. His article teems with the spirit of "Safety First." He sounds the call to battle and stirs enthusiasm in the blood just as the bugler does. I give him my vote for first prize.

No. 143 should be a stimulator to all who read it and should be posted upon the plant bulletin board or otherwise circulated through the plant to liven up interest in safety work.

I take pleasure in voting for No. 144, and I agree with the writer that the first qualification of the safety engineer is the knowledge he has obtained by experience —in shop, on engine room, in erecting machinery, in the art of handling men successfully and safely. Even after all this experience, he will have to give considerable thought to making changes to make some machines safe.

Safety work must be systematized to be successful. For that reason I vote for No. 142, the best article in the December number.

The writer of No. 142 has brought forth some good points. His general knowledge, necessary to obtain results, entitles him to first prize.

I consider No. 143 the best article in the December issue. The writer is certainly alive to the necessity and advantages of "Safety First" practices. The suggestions regarding the necessity of being ready to meet the conditions which are bound to come in the near future are

well timed. Too often, in the rush of business, production is the chief thought and accident prevention is sidetracked until some convenient time; but in order to sustain the results so far attained and to meet future conditions, those interested in "Safety First" will have to exercise eternal vigilance.

❦ ❦ ❦

The writer of No. 143 has written a sensible and eloquent appeal for safety, at a time when it will leave an indelible impression upon the minds of all business men who are planning greater activity during the present year. This article should be placed in the hands of all employers who have not begun to recognize their responsibility in the matter of accident prevention.

❦ ❦ ❦

I have decided that No. 143 is the best. It is well written, and furnishes some startling facts in the history of casualties in our industrial warfare, and the paragraph set in italics ably points out the means for preventing similar occurrences. I have found pleasure and profit in studying the good points throughout the whole article.

❦ ❦ ❦

My vote is cast for No. 144 in the December contest. If I would undertake to comment on the merits of the different articles I might switch my vote to No. 141. My principal reason for giving No. 144 the preference is, it exceeds in quantity the good stuff, though it does not excel in quality.

❦ ❦ ❦

No. 144 is a very complete discussion of what is required of the insurance inspector.

❦ ❦ ❦

My vote for first prize is for No. 141. His article is easily understood by a practical or technical mechanic. He calls particular attention to the causes of the greatest number of accidents, namely, improper practices, negligence in remedying known hazardous conditions, indifference to rules, carelessness in considering

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## MEMBERS OF COMMITTEE OF AWARD.

L. A. Beagle, F. A. Bowles, H. L. Brownell, P. S. Case, E. M. Coyle, P. LeRoy Flansburg, H. C. Ebeling, E. P. Elzy, Harry J. Goas, W. J. Grebe, Walter Greenwood, Gustav H. Guenther.

J. D. Hackett, Ray Johnson, William Kahn, John W. Keefe, John H. Korner, C. H. Liebfried, Ira Lockney, George E. Lucas.

George Martinson, R. S. McGee, John B. Munson, J. J. Ormsbee, D. W. Perry, L. A. Phelps, J. D. Rice, R. W. Robinson.

R. C. Salisbury, Charles B. Scott, Martin Seller, A. J. Seufer, William H. Shea, Charles E. Slyke, William P. Strickland, Howard Tilson, Bert S. Tule, R. J. White, L. K. Whitehead, C. S. Whitney, R. G. Wilcox, J. C. Youmans.

*Cities Represented:*

Amherst, N. S.; Baltimore, Md.; Boston, Mass.; Buffalo, N. Y.; Chicago, Ill.; Cleveland, Ohio; Columbus, Ohio; Des Moines, Iowa; Detroit, Mich.; Gilbert, Minn.; Hartford, Conn.; Hayden, Ariz.

Indiana Harbor, Ind.; Indianapolis, Ind.; Joliet, Ill.; Long Island City, N. Y.; New York, N. Y.; Niagara Falls, N. Y.; Peoria, Ill.; Philadelphia, Pa.; Pueblo, Colo.

St. Louis, Mo.; San Francisco, Cal.; Sheboygan, Wis.; Springfield, Mass.; Tacoma, Wash.; Texarkana, Ark.-Tex.; Waukesha, Wis.; Wausau, Wis.; West Orange, N. J.; Youngstown, Ohio.

*Corporations, Firms and Departments Represented:*

Aetna Life Insurance Company, American Smelting & Refining Company, American Steel Foundries, Avery Company, Canadian Car & Foundry Company, Carnegie Steel Company, Chicago Bureau of Safety, Chicago Surface Lines, Cleveland Railway Company, Columbus Iron & Steel Company.

Employers' Liability Assurance Corporation, Limited, Employers' Mutual Liability Insurance Company, General Accident, Fire & Life Assurance Corporation, Hartford Accident & Indemnity Company.

Illinois Steel Company, Inland Steel Company, London Guarantee & Accident Company, Limited, Maryland Casualty Company, New Jersey State Labor Department, New York & Queens Electric Light & Power Company.

Ocean Accident & Guarantee Corporation, Pickands, Mather & Company, Prudential Casualty Company, Safety First Society of Greater Detroit, Southwestern Gas & Electric Company.

Union Carbide Company, United States Fidelity & Guaranty Company, Wisconsin Industrial Commission, Workmen's Compensation Service Bureau, Zurich Accident Company.

fellow employes and thoughtlessness in following regular employment.

❦ ❦ ❦

I cast my ballot for No. 144, possibly, because I have been compelled to use diplomacy in my inspections during the time I have been employed at this work. The writer of the article is certainly familiar with the problems that inspectors are encountering in their work at every inspection.

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The December articles are all of high merit and almost equally eligible for the first prize, but I cast my vote for No. 142 as it more fully pertains to "Safety First" generalities than any of the other articles. No. 141 is a good article and deserves commendation. No. 143 is an exceedingly well written essay, giving sad truths, and carries a warning note to all interested in safety work.

❦ ❦ ❦

I choose No. 144 as the article to receive first prize. Although I do not know the writer nor his position, I feel confident he has had long experience. He has written on his subject in a thorough and practical manner.

❦ ❦ ❦

After studying the December articles carefully, I find one which could be put to practical use. The writer has put forth an idea which should produce a maximum in efficiency of operation and a minimum in serious accidents. The other articles are a little too general to aid the employer. I give my vote to No. 142.

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I cast my vote for No. 143. It is well written, and the writer has called attention to essential points of "Safety First."

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My vote is for No. 144. In commenting on the other articles, it does not seem to me that any of them have shown us the ways and means of safeguarding life and limb. However, all of the articles are very good, but I believe, from the inspection point of view, that No. 144 is entitled to the high honors.

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No. 143 is my selection for first honors among the several articles written under the above heading.

## DON'TS FOR MACHINISTS.

Among a series of Don'ts published recently by *American Industries* were the following:

Don't adjust the tool while the machine is in motion.

Don't adjust dogs while the table is in motion, as the wrench may get caught and a crushed hand result.

Don't brush chips off the ground by hand while the work is in motion. Stop the machine and use a brush.

Don't use the inside of the bed as storage place for tools, etc., if the bed is open and unprotected.

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*SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The prizes are awarded for articles describing or explaining Practices, Methods of Management or Operation, Regulations, Systems, Recommendations, Suggestions, Ideas, Safeguards, Safety Devices, or Apparatus. The Committee of Award will be influenced, in each case, by the evidence which the article gives of its writer's knowledge of and interest in accident prevention in general, as well as by the practicability and range of the concrete suggestions made and, in cases where these suggestions are peculiar to some particular industry, the understanding shown of the hazards of that industry.*

*The merits of all articles will be passed upon by a Committee composed of Safety Engineers, Managers, Superintendents of Plants and Workmen.*

*Drawings, sketches and photographs are invited whenever they will aid or supplement the descriptions in articles.*

*Contributors are requested to be as concise as possible. The competition is open to everybody competent to write on the subject without the requirement of a consideration of any kind for the privilege of competing.*

*Blanks upon which to submit articles will be furnished on application, but any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

# "THE FIGHT AGAINST FIRE"

## PRIZES FOR DECEMBER ARTICLES.

*First Prize. No. 34. Frank Glanz, Examiner, New York Fire Prevention Bureau, Bronx, N. Y.*

*Second Prize. No. 32. J. William Morgan, Deputy State Fire Marshal, Harrisburg, Pa.*

*Honorable Mention. No. 33. C. E Worthington, Engineer-Inspector, Wellesley Hills, Mass.*

*Comments by the members of the committee appear on page 78.*

*Conditions under which articles are submitted to this department are published on page 79.*

**No. 36** ADVANTAGES OF FIRE-RESISTIVE CONSTRUCTION.—Fire prevention in our country should not only consist in a general clean-up and removal of fire-breeding material, but it should consist of proper building construction and the regulations of laws to compel the removal of all fire hazards.

Should you be considering the building of a new home or other building or the remodeling of old ones, you should take into consideration the best method to make the building fireproof or as near fireproof as it is possible to construct it. Fire-resistive material should be used in its construction if possible and if not, every precaution should be used against the danger of fire, by having competent persons inspect and pass upon the safety of all heating, gas and electrical appliances and to see that all smokestacks, flues or chimneys are properly built. The cost of the erection of fire-resistive structures is only a few per cent greater than of ordinary structures, while the fire insurance rate is not over one-half of what it is on an ordinary building. The fire-resistive building will rent for a much better figure than a non-fire-proof building and will be occupied by a better class of tenants, and it will sell for a better price if the occasion should demand it to be put on the market for a quick sale. It is much warmer in the winter time and cooler in the summer, so it appears that for self-protection and self-interest it is best to build that which will best stand the elements of time and nature and give security against the ravages of fire.

No man has a right to build a home or other building that will jeopardize the life of himself, his family or others, and to endanger the property which may be adjacent when he can for a small additional cost erect a building that will be a credit to his community, a monument to himself and an example for his neighbors. If one-half of the fire waste of the United States would be expended each year in better construction of buildings, the fire waste would be decreased 75 per cent within five years and the insurance rates would decrease in a like proportion.

Better construction should be the slogan in all communities where civilized man exists, for it lessens the danger to life and property and will eliminate the fire hazard.

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**No. 37** HAZARDS AND WAYS OF FIRE PREVENTION IN DEPARTMENT STORES, CITY AND COUNTRY.

Department Stores, City.—The department store furnishes one of the worst cases of danger to human life and property that can be thought of; therefore, extraordinary precaution should be observed, both in the protection of life and the safeguarding of property.

The especial hazards in a department store in the city are the vast crowds who congregate in these stores daily and the utter impossibility to drill these people in the proper mode of procedure to be observed in case of fire or panic.

Should a fire occur in one of these stores during business hours, and especially on bargain days, the loss of life would be enormous.

The only thing possible to minimize this danger is to thoroughly drill all employes in the proper way of assisting the shoppers to the street or to the nearest exits. It would also be a good plan to employ a number of men, preferably retired firemen, to patrol the building during working hours. These men could be of great assistance in case of fire or panic, for the reason that years of experience would fit them for their duties, and they would be all the more valuable because at least two-thirds of the employes of department stores are women and girls and an experienced man among them would be of great assistance.

It would be a good plan to have diagrams of the building posted in conspicuous places throughout the building, with all exits and avenues of escape plainly marked thereon, also to have a competent person give lectures to the employes on the subject of fire prevention, fire protection and methods of escape, forming employes in groups and assigning to each group the exit to be used in case of fire or panic. The lectures could be held once every two weeks, or if it is impossible to hold these meetings so frequently, have them at least once each month. These lectures could be held after business hours and should last about half an hour. It could be explained to these employes that a cool head and quick action are necessary and very often the means of the saving of life, that by acting quickly and coolly, the people congregated in the store will not become panic-stricken and will in all probability escape unharmed.

Another hazard is that which is found in many large department stores, the large open space found in the center of the building, the rotunda, which extends from the first floor up to the roof. should a fire occur on one of the lower floors it would no doubt spread very rapidly up through this rotunda and branch out on any or all of the intervening floors, or should a fire occur on any floor near this rotunda it could be seen by the shoppers and the mere sight of the fire would no doubt cause a panic.

This hazard could be overcome either by completely eliminating this rotunda or the sides could be equipped with metal frames and wire glass, but I think if the rotunda would be done away with entirely it would be better for all concerned.

Another hazard is the vast amount of inflammable material contained in this class of store. The only remedy for this is extreme care on the part of the employes.

All shelves, fixtures, etc., should be of incombustible material and all kept scrupulously clean and free from dust.

There should be no stools, chairs, tables or any obstructions whatsoever in the aisles, especially those aisles leading to exits.

The necessary fire appliances should be installed, such as, standpipes, hose, nozzles, spanners, sprinklers with automatic alarm valves, axes, hooks, extinguishers, casks containing water, water pails, together with telegraphic communication with fire department headquarters.

Care should be taken in the packing rooms and workshops which must be kept absolutely clean and all excelsior and packing material should be kept in a metal-lined box.

Should a fire occur, in the day time, in one of these department stores, the fire department would, no doubt, be greatly handicapped in getting to work; as it would be utterly impossible to stretch lines through the entrances on account of the people pushing out. Should the fire be on the ground floor, I would advise the smashing of one of the front windows and getting in on the floor that way; should the fire be in the upper stories, go up by means of ladders placed there by the truck company and go in on floor by way of windows.

A lot more could be written about the dangers and precautions to be observed in the above class of building, but I believe the main points are covered.

Department Stores, Villages.—In regard to these country stores known as general stores, the hazards found there are also great, although not quite the same as the stores in the cities.

The danger there lies in the mixed stocks contained therein and, in a majority of cases, in the utter disregard for fire prevention or fire protection.

The loss of life would in all probability be small if any lives were lost at all, for the reason that very few persons are in these stores at one time; but the almost certain destruction of the building, if not of several buildings in the immediate vicinity, is assured, as the fire departments in towns and villages are, as a rule, volunteer companies, and by the time the alarm would be sounded and companies get to work, the fiery demon would have done his work.

I would suggest that owner and employes use the utmost care in the handling of all goods of an inflammable nature and keep the premises clean and free from dust, especially under counters and shelving. Sweep up all waste papers, old boxes and waste material, at close of each day, and keep them in a metal-lined box until ready to burn them in an incinerator a safe distance from buildings.

Do not allow smoking on the premises, as very often a lighted cigar or cigarette carelessly thrown away has caused a fire which in turn has snuffed out more than one human life.

I would suggest that a sufficient number of water pails and 3-gallon extinguishers be distributed throughout the building, as a pail of water or an extinguisher is a very handy friend if at hand when needed and may be the means of saving the building or, in fact, the whole block.

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**No. 38**

EDUCATION THE THING.—"Fireproof" is only a relative term. There is no known structural material that cannot be destroyed if exposed to fire for a sufficient length of time. So-called fireproof materials are simply fire-resistant because in a conflagration of the usual intensity they are not exposed to flame long enough to be destroyed. In this relative sense certain structural materials may be called fireproof.

Nearly every one knows what these materials are, because laboratory tests have been made, and structures composed of these materials have been subjected to fire under conditions sufficient to determine their worth.

The construction essentials that will secure the greatest protection against fire are well known and therefore need not be discussed.

Unquestionably the most potent measure that can be inaugurated to promote safety is education—education that will bring home forcibly to the individual not only the experiences of others, but particularly the great cost of his own experience. Some one has well said that everyone's experience profited him, and, in general, successes based on the experiences of others were attained far more cheaply than those resulting from one's own costly experiences.

The most dangerous element we have to contend with is the human factor. Children are not the only ones who play with fire. We live in houses veneered both inside and out. Looks count more than intrinsic worth.

There are enough laws and regulations to cover every contingency that will promote safety if observance of these laws and regulations were universally enforced. Education is the thing, and it must begin with the child. All known preventive measures against fire should be made a part of the child's school routine. Perhaps by no other means can we learn so well as by pictures, and if fire prevention associations and insurance companies would institute a country-wide motion picture campaign that would keep the awful havoc and devastation by fire forcibly before our eyes, we would learn little by little.

Insurance returns nothing of what we lose. Some one pays the bill, and we always pay our own share of our neighbor's loss of property destroyed by fire. Besides, this country is each year $300,000,000 poorer as a result of our enormous fire waste. In 10 years we burn up $3,000,000,000—labor, materials, effort, absolutely beyond replacement. It is a matter of but simple multiplication

to determine the actual wealth that might be permanently added to our nation's resources by reducing our fire waste so that it would at least be no greater per head than the figures shown by European statistics.

Conservation of forest resources is admirable; we have been prodigal of our once seemingly inexhaustible supply. But would it not indeed be a blessing if the last stick of constructional timber in this country were gone, so that we would be forced to adopt concrete, for instance, properly designed, for all structural purposes?

It would seem as though municipal bodies should have the police power extended to them that would compel us to build for safety. A sick child must be made to do what is right. We grown-ups often know what is best for us, but like the sick child, will not do it. We must be made to do it.

❦ ❦ ❦

FIGHTING FIRE ON THE FARM.

**No. 39** —It may be a common everyday occurrence in the city to have a building completely destroyed by fire, while buildings that are located close around it remain intact; but did vou ever hear of a big straw stack located within six feet of a large barn filled with grain, hay, feed, etc., completely destroyed by fire while the barn escaped untouched? It seems incredible, but that is exactly what happened on a farm I am particularly acquainted with; in fact, I was present at the fire from start to finish.

The fire started at the bottom of the stack and though it was seen almost as soon as it started, in less than no time it was all around the stack and leaping high in the air. Just how it happened nobody will ever be able to tell, but luckily several neighbors saw the fire very soon after it had started and came running across fields, while others at the telephone spread the alarm to all parts of the county. In less than half an hour after the fire started there were more than 200 men, women and children on the scene to offer their help. They came on foot, in buggies, on horseback and scores came in automobiles.

But what is the use? What could 10,000 men and women do with a burning straw stack located so near a big barn which at any minute might become a burning furnace, when there is no means to combat the flames? And to make matters worse, a light wind soon started up which carried the flames toward the barn and the other buildings that stood close by. Just this. Among that crowd of excited people was one who had not lost his head. First, when the fire started he had tried to combat it by carrying water with a bucket, but all in vain—the heat was too great and the water supply soon gave out. He tried to smother the flames with wet blankets, but without success. Some other way must be used. Now what happy thought do you think came into his mind? The neighbors who had seen the fire first were just beginning to arrive, and he, walking around to the west side of the stack suddenly stopped and sized things up. It was August 8 and a field of corn was growing in the neighborhood. He looked at the burning stack, then at the field of standing corn, then he asked one of the men who had just arrived how it would be to cut some of that green corn and throw it on the burning stack to smother out the flames. "That might do," was the reply. No sooner said than it was done. The corn choppers were fetched and men as they arrived on the scene worked as I have never before seen men work, cutting that green corn and throwing it on the stack that was now a mass of flames. More than an acre of this corn was cut and used in this way. It choked out the flames. It kept them from throwing sparks that might have set the barn on fire and made it possible for the men to get up on top of the burning stack and throw on water which was hauled from a neighboring spring in tanks. Several hours of strenuous effort won the day and what at first seemed a disastrous fire was conquered and cheated of its prey.

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AN INEXPENSIVE PRECAUTION.

**No. 40** —While working in a cotton mill village near here, I saw in use a simple precaution which the master mechanic said had reduced the village fire damage one-half.

The corporation owned practically all of the dwellings in the place and about four years ago bought enough fire pails to supply one to every tenant. These were regulation mill fire pails, painted red and labeled "For Fire Only." Upstairs in each tenement was a hook in a place designated by the master mechanic. The pails, filled with water, were kept hanging on this hook. This rule was printed on all rent receipts. Workmen were required to report infraction of the rule by any householder. A tenant whose pail was missing was required to pay the cost of a new one.

Although the master mechanic admitted that violations were quite frequent and pails were often used for other purposes, he declared that the scheme had saved its cost on several occasions; in fact, the suggestion it brought home to each of the first move in fire fighting he thought was worth all the system cost.

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QUERY OF NO. 35 IN DECEMBER SAFETY ENGINEERING.—It would be interesting to learn where No. 35 acquired the idea that an overhead connection from tank to riser is "all right in a single riser equipment." Certainly not from the published rules and requirements of the N. F. P. A. and National Board, which have specifically prohibited this method for some 20 years past.

It is essential that the entire influx of any riser be controlled by a single valve in the most accessible location, i. e., the lower level, as it must of necessity be below the lowest branches; therefore, whether there be one riser or several, the tank supply is required to be brought down intact to the basement or first floor.

The overhead feed is still to be found in equipments over 20 years old and not remodeled, but not in any equipment standard since 1895, along with pendent sprinklers, weighted check valves and similar obsolete devices.

The overhead feed making it necessary to close two valves at widely separated points to shut off water never was good engineering. The writer knows of at least one case where such a connection was in use where smoke from a small fire so filled the tank tower as to absolutely prevent access to the upper valve for over 20 minutes; result, fire damage about $30; water damage about $9,000. With a single shut off total damage should not have exceeded $250.

There are a number of other reasons for the regulation of a continuous discharge to lowest level and feeding up in end riser hardly needful to quote here, but all strictly material.

As to the second question, apparently the sketch is from an equipment having separate gates in main supplies on each floor, with drain valves from each branch connected with a single principal drain.

The theory of the check in the drain pipe leading to main drain is to prevent back pressure delivering water from a higher level through open sprinklers on a lower level. That is supposing a fire to simultaneously open sprinklers on the first and sixth floors and both drains be opened, unless the main drain was of ample size the water from the higher floor might not find sufficient exit and consequently in part find its way out of the open first floor sprinklers. The introduction of check here is simply precautionary against this remote contingency. Equipments thus arranged are not common. The sprinkler rules in their present published form cover these points very thoroughly.

## COMMENTS BY MEMBERS OF THE COMMITTEE.

In my opinion No. 33 deserves first prize. The writer emphasizes two points which I think are especially deserving of greater consideration than is usually given them. If the means of egress from the building are insufficient, occupants are quite liable, in the event of a fire, to fail to make the best use of such first aid appliances as may be available; a man not confident of his ability to get out of the building in case the fire gets beyond control does not usually make the best of fire fighters. Moreover, in the installation of first aid equipment the strength and skill of those who may be called upon to use it should al-

ways be taken into account. It is always desirable, also, that some person in authority make sure that the occupants of any given house are reasonably familiar with the correct use of whatever apparatus for fighting fire may have been provided therein.

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My selection of No. 34 is based on what I consider good sound suggestions brought forward by the writer in his article "Changing Over Old Buildings to Conform to Safe Requirements." It shows general knowledge of what is needed to cover the subject. His ideas are good.

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I have always been a strong advocate of fireproof materials in building construction, particularly in large tenement and private dwellings, for I believe that in these types of buildings a real hazard exists. The city in which I live is noted for its numerous homes of different designs, beautiful exteriors and enriched interiors; walls covered with gilded and variously tinted paper to catch the eye, hiding the poorly constructed partitions and party walls. From a conscientious inspector's or keen observer's viewpoint the construction of these dwellings is not stable enough to stand an ordinary gale or a slight blaze in its incipiency. If a person from out of town were to visit, as the writer of this article has often visited, these dwellings in course of construction and see how loosely brick party walls are built, joint over joint carelessly butted, carried as high as six courses in this manner, he would without a doubt ask himself the question: "Is the building inspection department of this first-class city asleep or is it advanced 'hush money' by its political friend, the contractor?" Yes, building departments are asleep, slumbering and growing fat financially, in this respect, instead of co-operating with fire preventionists in compelling the use of fireproof materials, partitions, etc., and properly built party walls—walls that should be of tile or good baked brick, butted well, and joints giving their proper bearings. Three ways of checking fire: Keep the bureau of building inspection out of politics, keep the fire department out of politics, and have legislated the use of fireproof materials in building construction, as the writer of Article No. 32 suggests, whom I honor this month with my vote.

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I select No. 32, because it covers a subject that is too readily overlooked. The home should be first and the factory second, but this order is usually reversed.

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My vote is in favor of No. 34. It covers a phase of fire prevention which is apt to be given minor consideration, either on account of the concentration of effort on new construction or because the application of fire prevention principles to old buildings is believed to be prohibitive in expense and to invade vested rights of owners.

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*To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The work and efficiency of public fire departments, fire prevention bureaus, and private fire brigades present many important subjects for discussion.*

*Short, practical articles are wanted on every subject that will prove of value to firemen (public or private), and to inspectors and others interested in The Fight Against Fire. Articles may cover methods and practices relating to fire fighting and fire prevention by public departments, faults of construction that create fire perils, the fire hazards of processes that endanger life and property, how firemen and public inspectors may qualify themselves for advancement, the character and use of apparatus and other equipment, private fire brigade organization and drill, employes' exit drills, regulations and requirements of all kinds, etc.*

*In passing upon the articles submitted, the Committee to Award Prizes will be influenced, in each case, by the evidence an article gives of its writer's knowledge of and interest in fire prevention or fire extinguishment, in general, and by the practicability and adaptability of the writer's suggestions and ideas.*

*Articles will be received from any person competent to discuss the questions of fire prevention and fire extinguishment. Contributions are especially invited from members of city fire departments and fire prevention bureaus, members of well established private fire brigades, insurance engineers and others. No consideration of any kind is required for the privilege of competing.*

*Drawings, sketches and photographs may be submitted whenever they will aid or supplement the texts of articles.*

*Blanks upon which to submit articles for this department of SAFETY ENGINEERING will be furnished on application. But any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

# SAFETY IN THE HUDSON TUNNELS

## WHAT THE HUDSON & MANHATTAN RAILROAD IS DOING FOR SAFETY

[Abstract of an address at the Second International Exposition of Safety and Sanitation, New York, December, 1914.]

WHILE the Hudson & Manhattan Railroad Company covers but a shade over eight miles, double tracked, or approximately seventeen miles of single track, in that short distance we have about fifteen junction points, four terminals, and are obliged to operate our trains in the rush-hour period 90 seconds apart, and at a high rate of speed. This will probably give you some idea of the problems which, from the very first, we have had to cope with. Having safety in view before the slogan was "Safety First," we tried to do everything in the planning and construction of the road to lead to absolutely safe operation. Although we have been running nearly seven years, have carried in that time well over 400,000,000 passengers, our worst accident to a passenger on a train or on a platform, has been a sprained ankle, or possibly pinched fingers in the doors, and falling down stairs. The signal system was made of the most advanced type; every signal, without exception, is protected by an automatic stop, so that if the signal is at danger, the train cannot pass it, but will be tripped, the power shut off, the brakes applied and the train will come to a stop. It is impossible for a motorman to go a car-length past a signal, although he may be going very fast when he approaches it. The control apparatus on the car is equipped with the "dead man's button," a contrivance on the control handle, so arranged that should the motorman become incapacitated or die at his post, the train would automatically stop, the power would be shut off, and the brakes would be applied, by the mere fact that the man's hand, through his incapacity, slipped over the control handle. Having stopped, the train is thoroughly protected from the rear by the automatic stops with which each signal is equipped. So much for the mechanical side; I might go on with further data on that point. The cars are of fireproof construction, absolutely all-steel, the floors of concrete, the wicker or rattan of which the seats are made is the only inflammable thing on the cars. The cars are further protected by anti-climbing and anti-telescoping devices, so in case a head-on collision should occur, the cars cannot telescope. We have tested to see if that can happen, and it cannot happen. So that the passengers in the cars, are, we may say, safe from any possible injury other than falling off the seats, perhaps, due to a sudden stop, or to accidents of that sort. They cannot be injured by the telescoping of the cars.

### CO-OPERATION OF THE MEN.

Much has been done, a point I wish to dwell on, by our efforts, to bring out the co-operation of the men. Before even a wheel was turned, Mr. McAdoo, who was then the president, called the men together and addressed them on the type of operation which was expected, laying great stress upon the safety side; laying great stress upon the fact that this was a public service corporation, to give service to the public, and that the employes must be courteous, they must be polite, they must be helpful. And there is one thing that is not permitted. It is never permitted to a guard or a platform man to say "Step Lively." We never permit them to speak to the passengers, except on business, unless the passengers speak first. And then we do compel them, if the passengers have spoken, to do all in their power to give the information asked for. A copy of Mr. McAdoo's address to the men, together with the little pamphlet on safety hints, is handed to each man when he is taken into the service. It is made part of his work, part of his duty, to read that and be ready to stand an examination upon it, because it contains the safety principles which should be lived up to. And we tell all of our men that they are on 90 days' probation; and unless during the 90 days they can show that they have a desire to follow the principles laid down by the company, have a desire to operate the trains and handle the passengers in the safety way;

to be patient, never to lose their temper; and to so behave that during the 90 days they can show themselves worthy of a permanent appointment, they will be let go before the 90 days are up.

The reason I am dwelling on that is that I think it has much to do with safe operation—by having good discipline, and having the men with you, the men taking a pride in safe operation, not only for themselves, but for the public. Furthermore, it has always been our effort to show the men that it is our great desire that, whatever work they do, they themselves should be working under safe conditions.

During the year ended June 30, 1914, on gross receipts of about $3,500,000, our total expense for accidents of all kinds and description, was $3,514. I think that shows the justification of our methods of handling the situation.

## SAFE MACHINERY.

The Eastman Kodak Company, when ordering machinery, furnishes this memorandum to manufacturers, with respect to safeguarding:

**To Machinery Manufacturers:**

**We are exerting every effort to not only safeguard our present machinery to the fullest extent, but also to have delivered to us all new machinery fully equipped with safeguards. In carrying out all orders for us you are expected to give the matter of safeguards your closest attention. Among others, the following protective devices are required:**

**(1.) Guards for all gears, even where apparently inaccessible, these guards to cover the full circle of the gear to mesh and to extend downward to the root of the gear teeth.**

**(2.) Fly wheels, pulleys or gears without webs or filled-in spokes are to be fully protected and where necessary the rims are to be guarded.**

**(3.) Projecting set screws and keys on revolving parts, if used, are to be covered and key seats on projecting shafts are to be filled, or, where possible, the shaft is to be covered.**

**(4.) All sprockets are to be thoroughly guarded.**

**(5.) Wherever necessary, provision is to be made for instantly stopping and starting the machine by the operator.**

**(6.) All levers and switches controlling movement of machinery are to be so constructed that they can be locked to prevent the starting of machine.**

**(7.) All machinery, such as woodworking, to which guards are customarily applied by the purchaser, are to be provided with such guards before delivery. In all proposals the manufacturer is to specify the type of protective devices to be applied.**

All machinery is required to conform, not only to the provisions of the New York State Labor Law, but to be provided with all proper safeguards for the protection of the operator and other employees. It is understood that if any deliveries made under this proposal do not fully conform to the foregoing specifications, the Eastman Kodak Company is at liberty to make any necessary changes at the expense of the seller, to secure such conformation.

## SAFETY RULES.

Rules published in *American Industries:*

Whenever possible start a machine by hand to be sure all moving parts are free.

It is extremely dangerous to set cutting tools in the moving machine.

Before throwing in an automatic feed, be sure the stops are set so that no damage will be done either to the work or machine by its use.

Form the habit of never standing in line with swiftly revolving parts, such as emery wheels, pulleys, etc.

Grind overlapping edges of chisels, drills, punches, set hammers, etc. Never leave oily waste or rags where they might ignite and cause fire.

Never attempt to stop a machine by grabbing the belt.

It is dangerous to wear finger rings while at work, especially for those engaged in handling boxes or working on drill presses and milling machines.

Don't pour gasoline into the cuspidors.

Do not attach fans to the spindles of drill presses, milling machines or other tools.

An efficient workman thinks before he acts. Are you efficient?

## MAY BE THE VICTIM, HIMSELF.

The workman who takes away the means of help may, in time of accident, be the first one to suffer from his own selfishness, the *Northern Safety Bulletin* remarks.

# WORKMEN'S COMPENSATION LAWS

## ACCIDENT PREVENTION AND REPORTS

THE workmen's compensation laws of eight States have provisions for rules, regulations, standards, safeguards, etc., for the prevention of industrial accidents. The workmen's compensation laws of twenty States have provisions for the reporting of all industrial accidents, besides particulars of payments of compensation as may be required by compensation commissions or industrial accident boards.

The "Digest of Workmen's Compensation and Insurance Laws in the United States," revised to December 1, 1914, by F. Robertson Jones, and published by the Workmen's Compensation Publicity Bureau, New York City, has the following paragraphs on the subjects:

### ACCIDENT PREVENTION.

CALIFORNIA. — Employer must do everything reasonably necessary to protect life and safety of employes. Industrial Accident Commission has jurisdiction over every place of employment and may prescribe rules, establish standards, require use of safeguards, etc., for accident prevention, and impose penalties to enforce same.

CONNECTICUT.—Employers' mutual insurance associations may prescribe and enforce reasonable safety regulations on the premises of members.

IOWA.—Industrial Commissioner, in co-operation with employers, shall fix standards of safety for places of employment other than mines under jurisdiction of mine inspectors.

KENTUCKY.—Where employe was injured through failure of employer to comply with safety statute, Workmen's Compensation Board may, upon hearing after notice to employer, assess against latter for benefit of State fund, an amount not to exceed 25 per cent of sum awarded as compensation. Where injury is sustained through failure of employer to discharge a non-delegable duty, similar assessment, not to exceed 10 per cent of amount awarded as compensation.

MARYLAND. — If employe injured through absence of safeguard or protection, required by State Industrial Accident Commission, employer liable to fine of $50-$500.

MASSACHUSETTS. — State Board of Labor and Industrial Accident Board jointly may adopt and enforce regulations, etc., for prevention of accidents and occupational diseases.

NEW YORK.—Employers may form association for accident prevention and adopt rules for that purpose, to become binding on all employers of same class, subject to approval of State Workmen's Compensation Commission and industrial board of labor department.

WASHINGTON.—If injury results from absence of safeguard, etc., required by statute or ordered by Industrial Insurance Department, employer liable to Accident Fund for amount equal to 50 per cent of compensation awarded. If employe responsible for removal of safeguard, compensation reduced 10 per cent.

### REPORTS OF ACCIDENTS OR OTHER INFORMATION REQUIRED BY EMPLOYERS.

CALIFORNIA.—Confidential reports of all accidents, on blanks furnished by Industrial Accident Commission, required of every employer and insurance carrier, who are thereby exempted from making similar report required by other laws.

CONNECTICUT. — Weekly report to Workmen's Compensation Commissioner of all injuries which result in incapacity for one day or more, and of notices of claims for compensation served by injured employes.

ILLINOIS.—Immediate report of fatal accidents; report between 15th and 25th of each month on injuries resulting in loss of more than one week's time; supplemental report on permanent disability cases. Reports to give certain prescribed details.

IOWA.—Report of accident within 48 hours after knowledge thereof; supplemental report after 60 days or upon termination of disability. Books, records and pay-rolls open to inspection by Industrial Accident Commissioner.

KANSAS.—Annual report to State Commissioner of Labor and Industry, giving such reasonable particulars as to accidents, compensation, etc., as he may require.

KENTUCKY.—Reports of all accidents resulting in personal injury, within a week after occurrence on blanks procured from Workmen's Compensation Board; fine of $500 for failure to comply. In the month of January each year, detailed statement as to number of employes, wages, etc., on blanks furnished by Board on request; penalty for non-compliance $500 fine. Books, records, etc., of employer subject to inspection by Board; penalty for refusal to submit, $100.

MARYLAND.—Immediate report of accidents to State Industrial Accident Commission. If insured in State Fund, report on pay roll every 4 months. Commission may require additional reports.

MASSACHUSETTS.—Report to Industrial Accident Board of all injuries, within 48 hours after occurrence; supplemental report after 60 days or upon termination of disability; $50 fine for failure to comply. Insurer must report to Board on compensation paid within 60 days after disability ends.

MICHIGAN.—Report to Industrial Accident Board of all injuries within 10 days after occurrence; $50 fine for non-compliance. Employers who are members of mutual association must submit books, pay roll, etc., to inspection of Insurance Commissioner upon request; penalty of $50 for refusal.

MINNESOTA.—Copies of settlements and releases to be filed with Labor Commissioner within 10 days after they are made.

NEBRASKA.—Report of all settlements and releases to Labor Commissioner 60 days after made. Supplemental report in case of death. Penalty for non-compliance, $50 fine.

NEVADA.—Immediate report of accident, to Industrial Commission and its local representative. Employer's books, records, etc., subject to inspection by Commission; penalty of $100 for refusal to submit.

NEW HAMPSHIRE.—Reports as required by Commissioner of Labor on blanks furnished by him. Failure to comply subjects employer to liability as though he had not elected to come under Act.

NEW JERSEY.—Employer and insurer required to report to Commissioner of Labor accidents resulting in disability for more than 2 weeks, within 4 weeks after occurrence; if in death, within 2 weeks. Penalty for non-compliance, $50 fine.

NEW YORK.—(Act of 1910). Report, with specified details, to Commissioner of Labor, of agreement with any employe to pay compensation under Act. Reports as may be required by Commissioner of compensation paid, etc.

NEW YORK.—(Act of 1913-14). Report to State Workmen's Compensation Commission of all accidents resulting in personal injury, within 10 days after occurrence. Penalty for non-compliance, $500 fine. Any information, requested by Commission, must be given, and employer's books, records, etc., subject to inspection.

OHIO.—Report to Industrial Commission of all accidents resulting in personal injury, within a week after occurrence; penalty for non-compliance, $500 fine. Annual report to Commission, in January, on employes, wages, etc. Employer's books, records, etc., subject to inspection.

OREGON.—Immediate report to State Industrial Accident Commission of accidents. Employer's books, records, etc., subject to inspection. Refusal to submit, or to report accidents, incurs penalty of $100.

TEXAS.—Report to Industrial Accident Board of all accidents resulting in personal injury, within 8 days after occurrence; supplemental report after 60 days or upon termination of disability. Penalty for non-compliance, $1,000 fine.

WASHINGTON.—Immediate report of accidents, to Industrial Insurance Department and its local representative. Books, records, etc., of employer subject to inspection by representatives of Department. Penalty for refusal to submit $100.

WEST VIRGINIA.—Failure to make any report required by Public Service Commission incurs penalty of fine not to exceed $2,500.

# HASTENING CONVALESCENCE IN INJURY CASES

## ZANDER METHOD QUICKLY RESTORES NORMAL CONDITION

*By Carl Fallén, M. D., Late Medical Director of the Zander Institute, New York, N. Y.*

[Abstract of a paper read at the Fourth Annual Convention of the International Association of Casualty and Surety Underwriters.]

THE most elaborate, as well as the most important method of advanced therapeutics that we find represented here at White Sulphur Springs, is the so-called "Zander System." I propose to lay before you in the simplest form its underlying theories.

Ever since 1884, when the Workmen's Compensation law was enacted in Germany, the influence of the physician in regard to these laws has been eminent and constantly increasing. Consider the treatment of millions of cases and you can readily see the value of saving one day in the time of recuperation of each case. Take the instance of a sprain, which I maintain should not require over three days' treatment, during which entire time the patient should be encouraged to use the injured part. Compare this with the records which show that an average time required for restoration of sprains is twenty-seven days, and you will realize what a saving could be accomplished if my statement be correct.

Numerous cases are discharged from the hospitals as cured and, while restoration of strength necessary to attend to their work may be delayed indefinitely with these so-called cured cases, no further treatment is accorded them; but the insurance company, or the employer, or the State Compensation Fund has to pay out 66 per cent of the regular wages of such employes. If these cases were properly cared for, statistics show that this time of convalescence could be shortened by 40 to 60 per cent.

The promulgation of the act for insurance against accidents in Germany in 1884 affected more than 200 trade associations which direct nearly 14,000,000 of workmen, or approximately one-fourth of the population of the German empire. Hospitals had to limit their treatment of such cases to a minimum. The lack of control of the after-treatment soon made special convalescent homes necessary, where the after effects could be overcome in the speediest way possible. In these institutions, massage and Swedish movements, with or without mechanical apparatus, constitute the principal treatment. Germany now has over 100 Zander institutes; and when you figure that a complete outfit of apparatus alone costs about $20,000, you realize what large investments have been made there representing only the mechanical side of modern treatment. Quoting Dr. Schütz briefly, I will now give you an idea of the system and some of the reasons for its success as an after-treatment of accident cases:

"The first and most important group of the Zander system contains the apparatus for active resistive movements. For each arm, leg, and trunk movement there is constructed one apparatus (in all, 40) which by means of its adjustment adapted to the anatomical conditions allows of the active exercise of a certain group of muscles. The resistance to be overcome is accurately known and can be increased or diminished as occasion requires. Zander has ingeniously attained the measuring of the resistance by the application of the weighted lever with a gradation along which the resistance weight is moved.

"There is a sure guarantee for the gradual increase of strength of enfeebled muscles. Over-exertion with consequent decrease of strength is out of the question with proper use of the apparatus under medical control.

"The second group in the Zander arsenal for us to take into consideration consists of a small number of apparatus for passive movements, for instance, passive hand-flexion and extension of separate finger-joints, passive chest dilatation, etc., etc. The apparatus is set in motion by some mechanical motor, while the patient, without making resistance,

allows the movement to be given him. Here again it is chiefly a question of making the joints flexible and of the tension of shortened muscles and tendons. By the uniform movement of the apparatus which cannot suddenly increase the appointed and adjusted range of movement, the patient experiences a feeling of security that the limit of painlessness, or of endurable pain will not be exceeded. The patient is not left to the mechanical power of the motor; he can at any moment stop the movement, let go the handle and rest.

"The third group of Zander apparatus serves to effect certain mechanical operations, such as vibrations, percussions, frictions, kneadings, of different and easily accessible parts of the body. Here the question is of a single massage manipulation, but only of regions where the mechanical apparatus can replace the action of the hand."

In the cases that result from accidents the primary efforts (except for surgical treatment) must be for the relief of inflammation in one form or another.

As for the consequences of prolonged inflammation with stasis and hardening of the soft tissues the drying up of synovial membranes, stiffening of joints, and adhesions, etc., these Zander machines are excellent as far as they go, but their adjustment and regulation of movements are not complete, and while this series contains various modalities for vibration they are, as a rule, not suitable for a practical breaking up of either adhesions, or clearing of articular surfaces which certainly should be the most important use for them.

SPRAINS.—Such an accident as spraining an ankle is usually looked upon as a serious affair, requiring immediate attention by a physician and weeks of idleness for the patient.

A sprain should never be treated with bandages or plaster of Paris. The condition of most sprains is simply this: No bones are broken or out of joint; simply, the ligaments are stretched, or perhaps torn from the bones. Blood is rushed to the part, causing swelling and pain by pressure on the nerves. Some blood vessels may have been ruptured and blood oozed out from them, causing stagnation of the circulation. This is the reason why rest or "immobilization" should not be allowed. For prolonged stagnation of the blood causes stiffness of the joint. On the contrary, the blood vessels and the lymphatics should be kept open by application of water as hot as the patient can bear. Gentle stroking upward should be given with the palm of the hand above the swelling. Thus the blood in the local veins is pushed up in the larger veins, giving room for the blood in the swollen part to be absorbed. By this method you can see at once how the swelling is reduced. The patient may think that the swollen part is too sore to be touched. But you may easily convince him that by simply touching the reddened skin you produce a cooling sensation and you can immediately proceed with the gentlest kind of stroking upward, even over the swelling. Then go over the parts above again with a little deeper stroking before going back to give gentle stroking to the tender swollen part. All stroking should be done in a direction toward the heart. If the stroking is done with sufficient care it may be kept up for an hour at a time. If the pain will allow any movement of the joint, do not delay trying it, as each movement causes an alternating opening and closing of the blood vessels, thus performing an act of pumping out the blood from the swelling, the retarding of which causes all the redness, swelling, heat and pain.

In daytime external heat for keeping open the small blood vessels (capillaries) is best kept up by water as hot as the patient can stand. Do not let it cool, but pour on more and more, if possible, with the foot under the faucet in a bath tub. At night, you let the affected part heat the water under a loose bandage and prevent cooling by supplying a watertight bandage. This is done in the following manner: Wet an ordinary towel in water of the room temperature and wring it moderately dry. Wrap it around the swollen part. Outside this towel, wrap a piece of oil silk, sold in drug stores for about 25 cents a square foot. Use only one layer with ends overlapping each other a few inches. Also see that it is wider than

the towel bandage, coming in contact with the skin for an inch or two above and below. Outside this oil silk wrap loosely another towel, or piece of flannel, to insure the keeping of the heat within the swollen part. This is not a bandage in the ordinary sense of compressing the part, but to prevent lowering the high temperature produced by the inflow of blood to the injured part. If properly applied, such a bandage should keep up an ever increasing heat and thus keep the capillaries open to allow a normal circulation to be restored and rapidly relieve the pain caused by pressure on the nerves. In the morning you should find the whole ankle soft and steaming hot. Now continue the manipulations and gentle movements of the day before, increasing both as fast as the painfulness will permit; any member of the family, or servants, can readily alternate, rendering this service to the patient all day long, thus hastening the natural process of recovery. Encourage the patient to use the foot as soon as possible, gradually learning to stand the pain as much as possible. The normal functions of the part produce the speediest restoration to a normal condition. The "immobilization" of the part with rest and tight bandages will delay recovery and cause stiffness and permanent enlargement.

# SAFETY WORK BY RAILROADS

NEW YORK CENTRAL LINES.—Discussing safety work by railroads, at the Second International Exposition of Safety and Sanitation, Marcus A. Dow, general safety agent of the New York Central Lines, said that there is not a railroad employe on any railroad but that, if he can keep his eyes open, and were trained to do so, would soon have the opportunity of doing a real service in the promotion of safety, and perhaps save a human life by giving a timely, friendly warning to some fellow-employe whom he sees doing a thoughtless or an impulsive thing which might result in an injury. That is the kind of co-operation on the part of the men in the ranks that is necessary to make the safety movement a complete success.

"The mere slogan, 'Safety First,'" Mr. Dow continued, "counts for nothing if these men do not understand and are not trained to understand its full meaning, and live up to the spirit of it. Upon their fellow-employe, to a large degree, depends their own safety, and the thoughtfulness and self-control which guide the careful man in his work must be inculcated by that man into the mind of the man who works with him, in order to make the safety movement a complete success. That is the work we have undertaken on the New York Central—to instill the safety spirit into all of our employes and recruit a vast army of safety men, and teach them that safety men and thinking men are just as important as, and a great deal more important than, safety appliances."

The New York Central Lines have conducted their safety work through lectures and bulletins, through stereopticon lectures given on the safety car, which has been taken over the entire system, and the railroad company has even gone so far as to require the men to attend the lectures on the company's time. Bulletins and pamphlets have been issued frequently, calling attention to the things that cause injury.

"Our work," said Mr. Dow, "has not been confined entirely to the education of the employe; we have endeavored in the widest possible manner to bring this home to the public, in order to prevent accidents to outsiders, notably the trespassers. New York State is in advance of most other States, in that it has a definite law prohibiting trespassing upon the railroad tracks, and making it a punishable offense. The great trouble in the past is that there has been woful neglect with regard to the enforcement of that law.

We have realized that such a law in itself would not prevent trespassing, nor trespassing accidents, but that such legislation must be reinforced by a thorough and systematic education to teach all persons the justice of such laws,

that they were framed for their own protection, and to save human life. So we employed a safety agent and put him especially on this work of trespassing. We had him go up and down the entire railroad and call upon the judges of courts having jurisdiction in the different sections, to win their co-operation in the enforcement of this law, for humanity's sake. We also had him, not only in New York State, but in other States through which we run, call upon the editors of newspapers. We had him post warning notices over the entire road, warning the public against trespassing; and because we did all of these things and a great many more in a thorough, persistent and systematic manner, there were on the four principal roads of the New York Central Lines, during the year ending June 30, 1914, 189 fewer trespassers killed, and 83 fewer trespassers injured. Because we did this educational work, not only as to our own employes but as to the general public, there were on these same four principal roads of our lines during the twelve months ending September 30, 1914, as compared with the twelve months ending September 30, 1913, 330 fewer persons killed, and 4,074 fewer persons injured.

"On the New York Central alone, during the year ending June 30, 1914, as compared with the previous fiscal year, there were 109 fewer persons, all classes, including trespassers and employes, killed than during the previous fiscal year, and 1,068 fewer persons injured.

"On the New York Central & Hudson River Railroad, during the last three years and eleven months, up to the present time, we have carried a number of passengers, equaling approximately twice the entire population of the United States, and not one of them has been killed in a train accident.

"Our entire aim has been to do safety work in a constructive manner. We did not start out with a great hurrah and shout the slogan 'Safety First' and let it go at that. We worked along clearly defined lines, and have endeavored to point out the things that are unsafe, what causes accidents and what must be done to prevent them. According to our own results, I feel that if this method is employed generally throughout the country, beginning with the children in the public schools by teaching and training them in the ways of safety, and inculcating in them habits of safety that will serve them through all the years of their lives—if that plan is followed in every manufacturing plant, on every railroad, a national conscience will be created that will frown upon the taking of unnecessary chances. It is bound in the end to bring about humanitarian results that will be the greatest monument to our civilization that was ever erected!"

CHICAGO & NORTH WESTERN. —In the three years ended June 30, 1914, 17,380 employes of the Chicago & North Western Railway were injured "in little accidents that can be prevented in less time than it takes to make reports." In the same period 401 employes were injured in collisions and derailments. The number hurt in the little accidents was 97.8 per cent, or 44 out of every 45. The number hurt in collisions and derailments was 2.2 per cent, or one in every 45.

In the three years ended June 30, 1914, 185 employes of the same railroad were killed in the same sort of "little accidents." In the same period 17 were killed in collisions and derailments. The proportion injured in minor preventable accidents was 91.6, or 11 out of every 12. The number killed in collisions and derailments was 8.4 per cent, or one in every 12.

During the year ended December 31, 1913, the causes of accidents in which employes were injured while on duty were as follows: Careless practices, 5,232 or 81.81 per cent; unavoidable accidents, 651 or 10.18 per cent; defective engines, cars, track, tools, machinery, etc., 381, or 5.95 per cent; derailments and collisions 131 or 2.05 per cent.

During the year ended December 31, 1913, the causes of accidents in which employes were killed while on duty were as follows: Careless practices, 51 or 76.12 per cent; derailments and collisions 8, or 10.94 per cent; defective engines, cars, track, tools, machinery, etc., 7, or 10.45 per cent; unavoidable accidents, one or 1.49 per cent.

In the last three years 6 employes have

been killed and 5 others seriously injured by getting off engines or cars directly in front of trains on other tracks, or by running across tracks in front of moving trains.

Comments by R. C. Richards, chairman, Central Safety Committee, Chicago & North Western Railway Company:

"'Safety First' stands for conservation of human life, elimination of chance takers, who are the makers of cripples, widows and orphans; for safety men as well as things; for greater safety and regularity. In 53 months on the Chicago & North Western Railway it resulted in 369 fewer deaths and 11,258 fewer injuries."

DYNAMITE IN MINERS' TRUNKS.—Coal mining companies are proving of assistance to the Pennsylvania System in a campaign to end the practice of coal miners of packing dynamite and other explosives in trunks, which they check as baggage when they travel from one mine to another. Serious accidents have occurred as the result of explosions of dynamite in trunks and suit cases checked as baggage. It has developed that one reason why coal miners, most of whom are foreigners, pack dynamite and other explosives in their trunks and other pieces of baggage is that when they move from one mine to another they do not feel they can afford to throw away any blasting material they may have on hand. The railroad's rules against carrying explosives in trunks and other baggage are printed in foreign languages and posted at practically all mines, and it is thought that the regulations are known to most of the miners. If, therefore, the mine companies agree to buy back at the original price any extra explosives the miners may have, it is thought the practice of packing such materials in trunks will be eliminated to a large extent.

PENNSYLVANIA LINES.—The Pennsylvania Railroad Lines East of Pittsburgh in the past two years carried 311,675,794 passengers and not one of them was killed in an accident to a train. In four of the past seven years, 1908, 1910, 1913 and 1914, more than 558,000,000 passengers, five times the population of the country, were carried by the Pennsylvania Lines East of Pittsburgh without a single passenger being killed in a train accident.

## LADDER HAZARD IN MILLS.

It would hardly be possible to find a carpenter, painter or other tradesman who constantly uses the ladder, who has not at some time or other had some slight fall due to the slipping or falling of a ladder, says the *American Miller*. Around the mill, ladders are used perhaps not much, but enough to allow a few words of caution which may be responsible for preventing a few accidents.

Only a short time ago, a ladder slipped and the employe fell to the floor, striking his head, causing concussion of the brain. It is such an easy matter for a ladder to slip as it rests on slippery oiled floor or on a concrete sidewalk or floor. Sometimes space in a mill does not permit the ladder to be placed at the proper angle to cause it to stand securely, the base slips, the employe is thrown to the floor and a fracture results.

In places where machinery takes up a great deal of room it is often the case that in order to reach some desired point ladders are set at all angles. Sometimes only one foot rests on a foundation; weight on the ladder causes it to swerve or twist, generally resulting in a bad fall.

In Germany during the year 1908 in agricultural pursuits the falls from ladders caused the most accidents. In trades and building occupations falls from ladders caused second the largest number of accidents, being second only to those accidents caused by motors and engines.

Accident prevention societies are too busy looking after the appliances for complicated machinery to think about a little thing like ladders. As a general rule, mills have only a few ladders about the place. Accident prevention devices are so simple that for the few ladders about the place the miller can easily and with little expense equip his ladders in order to insure against the serious accident of some employe. Small pieces of rubber and sharp points to keep ladders from slipping are the most effective accident prevention devices.

# MACHINE SHOP AND FOUNDRY

**MACHINE SHOP AND FOUNDRY. UNIVERSAL SAFETY STANDARDS. A reference book of rules, drawings, tables, formulae, data and suggestions for use of architects, engineers, superintendents, foremen, inspectors, mechanics and students. By Carl M. Hansen, M. E., Consulting Safety Engineer, Member American Society Mechanical Engineers. Compiled under the direction of and approved by the Workmen's Compensation Service Bureau, New York, an association composed of 18 of the leading stock casualty insurance companies whose principal work is the determination of correct workmen's compensation and liability insurance rates. Attractively bound in limp seal leather, 312 pages, indexed. Price $3.00, net. Postpaid $3.12. Universal Safety Standards Publishing Company, Philadelphia.**

This is the first of a series of books to be issued under the direction of the Workmen's Compensation Service Bureau, in the course of the next two or three years. The titles of the others are to be Woodworking, Leather and Shoe, Mercantile and Theaters, Textile and Clothing, Brick, Pottery and Glass, Paper, Printing and Allied Trades, Electrical, Grain and Flour Milling, Dyeing and Laundry, Mining, Miscellaneous. The books are to be compiled under the direction and with the approval of the Workmen's Compensation Service Bureau. They will all bear the endorsement of the leading compensation and liability insurance companies. The standards will be exclusively used in fixing rates for workmen's compensation insurance under the Universal Analytic Schedule.

Very properly the author gives first attention to the buildings in which employes are housed. Standards are given for the height and construction of buildings and their protection against fire hazards. All buildings must be equipped with effective and ample fire fighting apparatus, such as automatic sprinkler systems, hose, fire pails, chemical extinguishers, etc. Apparatus of this nature is to bear the label of the Underwriters' Laboratories. Specifications are given for exits, fire escapes, protection of fire escapes which border windows by wireglass and metal frames, fire resisting and smokeproof towers, fire walls, fire drills, etc. Thus the fire prevention movement for the purpose of saving life and limb as well as property is to be brought home to every manufacturing establishment and the rate of insurance for workmen's compensation will be appreciably affected by the character of the factory as a fire risk. When it is considered that 20,000 plants were "merit-rated" in 1914, having 1,200,000 employes with a pay-roll of $700,000,000, it will be seen how effective the application of the Universal Safety Standards is to be in fire protection.

The author strikes the keynote of industrial safety when he lays down the principles of safeguarding in such a way as to make one realize that he is fully capable of handling this tremendous problem. In fact, the principles of safeguarding may be compared to the axioms of geometry; they are self-evident.

Compensation laws have made indemnity for accidents compulsory. This indemnity is one of the large items in the cost of production. To reduce the cost of production and effect a saving in operation, accident prevention is one of the most prolific fields. Employers and others interested in safety need authoritative information on the methods of assuring safety which will meet the requirements of the rulings of their insurance companies.

In order to supply this demand, safety must be standardized. The Workmen's Compensation Bureau has seen fit to adopt Universal Safety Standards as its minimum requirements for industrial safety. It makes this approval because the book MACHINE SHOP AND FOUNDRY (Universal Safety Standards) represents, in its opinion, the ideal condition for which they are constantly striving. These standards were prepared with the aid of some 80 engineers working under Mr. Carl M. Hansen's direction and with the advice of and contributions from the leading industrial organizations in the country.

These standards have been quoted so freely by the different State Labor Commissions that they now represent the basis of the labor laws in practically every compensation State in the Union. This book is the only means of familiar-

izing one's self with the basic standards of accident prevention. It is the only "how" book on industrial safety. It is the only standard handbook on safety engineering in the world. It is a collection of conditions ordinarily found in machine shops and foundries with proper safeguards applied. It treats these conditions with plain, clearly worded, brief specifications and illustrates the specifications with drawings. It shows at a glance what is needed and the need is supplied with what is advised by the insurance companies and incidentally the State Labor Departments. It takes up conditions in the construction of the plant, follows the products from the receiving department to the shipping room and shows how in each instance, safety measures may be applied.

SHOWS HOW CONDITIONS AND MACHINES MAY BE MADE SAFE.

The book is purely a "how" book on safety as opposed to the usual type of "why" book. It starts where others stop; viz., where others convince you that safety is necessary, this book shows what is necessary for safety, describes and specifies conditions and machines and safe means and measures for guarding them.

But it does not stop there. With each specification it shows a detailed drawing of what the specification means, all of which is the application of the principle of safeguarding. This arrangement makes everything absolutely clear even to the machine operator. Very interesting examples are the treatment of stairways, steam engine guarding and grinding wheel protection.

The book is classified into four parts: General, Machine Shop, Foundry, and Rules and Practices. Each division touches practically all cases that arise under that classification. The book is justly confined to the conservation of life and limb rather than the conservation of property and touches hazards in this way. This makes it an invaluable book to employers of labor. On the whole it may be said to be a well-prepared book, by an engineer well up on this subject and a book of extreme value to all architects, engineers, foremen, inspectors and employers of labor.

This system is now being applied in 13 States and last year produced a saving in premiums in the neighborhood of $2,000,000. The cost of installing safety devices in general is made up in the savings on insurance premiums, as computed on the Universal Analytic Schedule. It is the first time that a comprehensive study of this kind has been made.

## UNSAFE REFORMATORIES.

A fire of unknown cause which resulted in a loss of $150,000 (by which no lives were lost, as the buildings were deserted at the time), destroyed two industrial annexes of the New York State Reformatory at Elmira during the morning hours of December 8, 1914. The fire was discovered at 2 a. m. and continued six hours.

Both the paint and carpenter shop were constructed of brick walls, wooden floors and slate covered roofs. The construction as well as the combustible contents favored the spread of the fire, the firemen were handicapped by a scarcity of hydrants and an insufficiency of water pressure, the reformatory being situated just within the city limits. One inmate of the institution who assisted in fighting the fire was injured.

In buildings of a public nature such as those destroyed ample means of fire protection are to be expected as a matter of humanity. The Elmira institution had no equipment worth mentioning in this respect.

That fires in buildings of this class are by no means rare is shown by the fact that the State Reformatory at Marianna, Fla., lost one of its buildings, of construction substantially similar to that of the Elmira buildings, on November 18, 1914. The fire was discovered about 3 a. m. and lasted an hour. All but nine of the 75 occupants of the building escaped by way of an iron fire escape. In this instance, too, no fire-fighting equipment had been provided by the authorities responsible for the lives of the inmates.

SAFETY ENGINEERING has a record of not less than 10 institutions of this class which suffered severe fire losses during the past year.

# COLORED GLASSES FOR EYE PROTECTION

*Extracts from a Paper by Frederick W. King*

FREDERICK W. KING, president of the F. W. King Optical Company of Cleveland, O., has transferred the industrial department of his business to the Julius King Optical Company of New York, where he will make his headquarters assuming, as one of the members of this firm, the management of the safety department. As a result of his experience after a series of visits through the majority of the largest steel plants and foundries in the United States, Mr. King has become thoroughly familiar with every condition of manufacturing in which the eyes of workmen are in danger from hazardous occupations. The following extracts are from a paper read by Mr. King, entitled "Report on Colored Glasses for Eye Protection."

**Frederick W. King.**

REPORT ON COLORED GLASSES FOR EYE PROTECTION.

"The ultra violet rays in welding are injurious as they destroy animal tissue. They occur, in a dangerous volume, at a temperature of over 2,000 degrees F. in molten iron or steel and greatly increase in proportion as the temperature is increased. At 6,400 degrees, encountered in electric carbon arc welding, they will probably cause permanent blindness within three minutes, if the eye is not protected.

"Over 90 per cent of the colored glasses used today, for the above purposes, are not only scientifically incorrect but are, in most cases, decidedly injurious.

"Smoked glass is by no means the only inefficient color used in oxyacetylene welding. In many cases blue is used. This is wrong as it allows the very rays to enter the eye that it is necessary to cut out. Besides this it is too dark and cuts out too much of the non-injurious light. The new color, known as the 'Saniweld,' eliminates all of the ultra violet, the violet and the blue. It also reduces the infra red which, by its excessive energy, is the principal cause of eye fatigue. In tone the new glass is a sort of brownish orange and in its darker form enables one to look directly at the sun at midday without experiencing any discomfort.

"The first objection the men bring forward (and, incidentally, it is their only objection) is that the glasses are too light in color. This is the best point from even their own view because, if all the ultra violet rays are eliminated, the remaining portion of the spectrum does not have to be anywhere nearly as much reduced as with the dark glasses they have been using, and as a consequence they can see to walk about with correct lenses and follow a chalk line in cutting that they were never able to do before. The personal equation has, in certain cases, to be somewhat considered and if an operator insists upon a darker shade, it can readily be supplied.

"The chief work of the writer has been inspections of the larger plants where, incidentally, there is often a very great amount of welding done. It was, there-

fore, a great advantage to observe the defects of present styles of glasses under shop conditions and to develop a new model that would, as nearly as possible, cover all the good points of glasses already in use and possess features that were necessary, but lacking in all observed.

"The new frame designed by the writer, is of aluminum construction throughout. The cups, containing the lenses, are of anatomical shape and conform so closely to the contour of the orbit that they will even keep out the fumes of acid. These cups have a cap that, by a very slight turn, comes off and allows a new lens to be inserted in a few seconds. They are correctly padded so the cups do not become hot even in the heaviest welding. An excellent feature is the special ventilating arrangement. These ventilators may be opened or closed at will and are so placed that no sparks or splashes of metal can enter. Adjustable head bands are used instead of ear temples, to hold this new model in place; and they may be renewed if they become worn.

"There are many purposes, besides welding and cutting, where this model, called the 'Dustsafe,' may be used to great advantage for use around a blast furnace, for all conditions of flying dust and dirt, splashes of metal or acid, for locomotive engineers and firemen, for lap welding, for furnacemen and for many other uses."

## SAFETY OIL CAN FOR BELTS.

A device for safely oiling belts and pulleys has recently been constructed by a Detroit inventor.

This is an oil can mounted upon a pole and arranged to automatically right itself whether filled or empty, and is tilted over to exude the oil by means of a string; this enables oiling of boxing and shafting alongside of large belt wheels, belts or close places with security, while at the same time enabling a man to perform the work in about one-third of the time ordinarily required by using a ladder.

**A Detroit idea for safety in oiling belts and pulleys.**

The pole is useful in putting on belts, or throwing them off, and the can is readily removed for hand use where access from the floor may be had, and appears to warrant wide publicity from the insurance companies in accident prevention.

The accompanying photograph shows the can mounted upon a pole with a socket, and so pivoted as to swing in the trunnion in which it is mounted, being actuated by the cord which is quite clear in the photograph. The man is holding the oiler in about the position and height employed in oiling shafting or counters. The security enjoyed by him in doing this work is apparent.

# MATERIALS, APPARATUS, PROCESSES

## SECOND INTERNATIONAL EXPOSITION OF SAFETY AND SANITATION.

The Second International Exposition of Safety and Sanitation was held at the Grand Central Palace, New York City, December 12-19, 1914. Safety devices for the protection of life and property against accident and fire destruction were exhibited. There was a large attendance of safety men as well as the general public.

Following is a list of some of the exhibitors, the products exhibited and the awards received:

A. B. C. Elevator Gate Company, New York. Automatic elevator gates. Silver Medal.

Aetna Life Insurance Company, Hartford, Conn. Bureau of Inspection and Accident Prevention. Exhibit of photographs of different industrial hazards. Grand prize.

American Abrasive Metals Company, New York. "Feralun" slip-proof treads. Grand Prize.

American Model & Instrument Company, Worcester, Mass. Electric signal system and automatic fire alarm. Sign flash systems. Grand Prize.

American Museum of Safety, New York. Exhibit showing the work being accomplished by the American Museum of Safety in fire and accident prevention.

American Mutual Compensation Insurance Company, New York. Exhibit of photographs, models and specimens of defective cables which caused accidents. Other accident prevention and fire prevention devices. Gold Medal.

Angell Elevator Lock Company, Boston, Mass. Angell safety floor stop and lock. Model and photographs. Gold Medal.

Auto Signalite Company, New York. Automobile signal. Silver Medal.

A. Bataille & Company, New York. Patent elevator gate. Silver Medal.

Bristol Company, Waterbury, Conn. Safety set screws. Gold Medal.

Brooklyn Rapid Transit Company, Brooklyn, N. Y. Exhibit by Brooklyn Institute for Safety. Figures, charts, steriopticon views of models of safety work in operation on this system. Grand Prize.

Casualty Company of America, New York. Exhibit of the official car of the "Safety First" Society of New York, which accomplished a 3,900-mile tour through 17 States, visiting 70 cities in the interest of the "Safety First" movement. Honorable Mention.

Clinton Wire Cloth Company, Clinton, Mass. Exhibit of Clinton welded wire and Clinton fireproof construction. Clin-trus wall furring and lathing for exteriors. Honorable Mention.

Clipper Belt Lacer Company, Grand Rapids, Mich. Clipper for belt lacer. Gold Medal.

Consolidated Engine Stop Company, New York. Models of different types of automatic engine stops. Gold Medal.

Consolidated Expanded Metal Company, New York. "Steelcrete" mesh for machinery guards. Commemorative Medal.

Corbin Cabinet Lock Company, New Britain, Conn. Photograph and models of the Corbin press guards. Gold Medal.

Crescent Machine Company, The, Leetonia, Ohio. Crescent safety head for jointers. Gold Medal.

Diamond Match Company, New York. "Safe-Home" match. Apparatus for testing the "Safe-Home" match as required by the Underwriters' Laboratories. Live guinea-pigs feeding on the "Safe-Home" match to demonstrate its non-poisonous qualities. Grand Prize.

Elevator Supply & Repair Company, New York. Elevator safety devices and Ideal Automatic Fire Detector. Gold Medal.

Electrene Company, New York. Electrene fire extinguishers. Gold Medal.

General Fireproofing Company, New York. Attractive exhibit of all-steel office furniture, including filing cabinets, desks, chairs, safe and bond boxes. Commemorative Medal.

L. F. Grammes & Son, Allentown, Pa. Exhibit of danger signs and press guard, saw guards, Benjamin safety and efficiency devices. Gold Medal.

Emil Greiner Company, New York. Respirators. Commemorative Medal.

Hirsch Electric Mine Lamp Company, Pittsburgh, Pa. Electric safety lamps for all purposes. Miners' safety lamps. Gold Medal.

Improved Ash Can Company, New York. Model garbage cans. Honorable Mention.

Independence Inspection Bureau, Philadelphia, Pa. Charts and photographs showing the service performed by the Independence Inspection Bureau in fire and accident prevention, among municipalities, States and manufacturers. Honorable Mention.

Joint Board of Sanitary Control, New York. Charts and photographs showing the work being accomplished by this company in the cloak, suit, skirt, dress and waist industries, for bettering conditions of welfare. Gold Medal.

A. G. Kaufman Manufacturing Company, New York. The Power Light Lamp—a safety oil lamp which cannot spill or explode when dropped. Gold Medal.

Kreips & Reinhardt, New York. Punch press guard. Gold Medal.

Lambie Brothers, New York. Exhibit of blue prints and photographs of fireproof houses. Silver Medal.

Leonard Sheet Metal Iron Works, Inc., Hoboken, N. J. Fireproof doors and windows. Honorable Mention.

McNutt Can Sales Company, New York. Non-explosive gasolene cans. Grand Prize.

Marine Efficiency Company, New York. Models of automatic davit and self-lowering davit that insures safety at sea. Gold Medal.

Metropolitan Engineering Company, New York. Air washer and dust catcher. Gold Medal.

Minneapolis Heat Regulator Company, Syracuse, N. Y. Heat regulators. Commemorative Medal.

Mossberg Wrench Company, Central Falls, R. I. Counter shafts and belt shifters. Gold Medal.

MORRISON SAFETY LADDER SUCTION COMPANY, LOWELL, MASS. The Morrison safety ladder. Silver Medal.

MORTON VACUUM BREAKER COMPANY, HYDE PARK, MASS.—Safety device for preventing engine accidents. Silver Medal.

NATIONAL AUTOMATIC SPRINKLER ASSOCIATION. Exhibit of photographs and literature, sprinkler heads and working model showing the economy and protection afforded by automatic sprinkler protection. Grand Prize.

NATIONAL SAFETY COUNCIL, CHICAGO, ILL. Exhibit of Weekly Bulletin service which is sent out to members. Gold Medal.

NATIONAL SAFETY DEVICE COMPANY. Morgan's National Safety Hood for protection from smoke and fumes. Gold Medal.

NEVER SLIP SAFETY CLAMP COMPANY, NEW YORK. Patented safety clamp for handling boiler plates, etc. Gold Medal.

NEWARK CORNICE & SKYLIGHT COMPANY, NEW YORK. Metal doors, windows and partitions. Gold Medal.

NEW JERSEY ZINC COMPANY, PALMERTON, PA. Exhibit of the safety, sanitation and welfare work in operation in the properties of this company. Working model of mine shaft at Franklin, N. J., showing the safety features of this apparatus. Models of education, recreation and social centers, playground and workmen's houses, photographs and other exhibits of accident prevention work. Grand Prize.

NEW YORK CENTRAL LINES, NEW YORK. Exhibit of photographs and lantern slides, models showing safeguards in use in the New York Central shops, model of locomotive. Grand Prize.

NEW YORK EDISON COMPANY, NEW YORK. Exhibit of accident prevention practice and safety work in use in this company. Grand Prize.

OTIS ELEVATOR COMPANY, NEW YORK. Model of freight elevator equipped with Peelle doors. Automatic elevator machine. Gold Medal.

PEELLE COMPANY, NEW YORK. Peelle counterbalanced fire doors for freight elevators. Gold Medal.

S. H. POMEROY, INC., NEW YORK. Exhibit of fire retardant windows. Gold Medal.

NICHOLAS POWER COMPANY, NEW YORK. The well known 6-A Cameragraph was exhibited, and also traveling outfit of the Power's Cameragraph and the dissolving stereopticon. The Power's 6-A Cameragraph was the machine selected by the International Exposition for use in illustrating lectures at the conferences. In addition to the moving picture machines, there was on exhibition at this booth the Power's Advertiscope, another original invention of Mr. Nicholas Power, exhibited for the first time. It is an ingenious card-displaying machine which works automatically. Grand Prize.

PRESSED METAL RADIATOR COMPANY, NEW YORK. Sanitary radiators for the wall and floor. Honorable Mention.

PUBLIC SERVICE CUP COMPANY, BROOKLYN, N. Y. "Lily" sanitary drinking cup. Honorable Mention.

PULL CLEAN TOWEL COMPANY, PHILADELPHIA, PA. Pull-Clean sanitary towel.

PULLMAN COMPANY, CHICAGO, ILL. Section of all metal car. Charts and photographs of "First-Aid" equipment. Grand Prize.

PURO SANITARY DRINKING FOUNTAIN COMPANY, HAYDENVILLE, MASS. Combination sanitary drinking fountain and faucet. Gold Medal.

PUTNAM & COMPANY, NEW YORK. Railing step and extension ladders. Commemorative Medal.

QUEEN & CRESCENT ROUTE. Exhibit of photographs showing the accident prevention work on this system. Grand Prize.

THE RADIUS COMPANY, INC. Wickless kerosene stoves. Commemorative Medal.

ROBINSON-RODERS COMPANY. Life saving equipment. Gold Medal.

JOHN A. ROEBLINGS' SONS COMPANY, NEW YORK. Steel ropes and chains. Silver Medal.

ROTH ELEVATOR SAFETY DEVICE COMPANY. Elevator safety devices. Gold Medal.

SAFETY APPLIANCE COMPANY, ST. LOUIS, MO. Elevator safety device. Gold Medal.

SAFETY ENGINEERING, NEW YORK. Safety Engineering, "The Magazine of Safety." Leading books on accident prevention, fire prevention, safety and sanitation. Silver Medal.

SAFETY FIREARMS COMPANY, ELMWOOD, CONN. Safety device for guns. Gold Medal.

SCHUM BROTHERS, NEW YORK. Positive nut lock. Silver Medal.

SHAW PROPELLER COMPANY, BOSTON, MASS. Safety wrench.

SHUR-LOC ELEVATOR SAFETY COMPANY, NEW YORK. "Shur-Loc" elevator safety device. Grand Prize.

SOUTHERN PACIFIC COMPANY. Exhibit and photographs showing the safeguarding in the shops of this company. Also the welfare and sanitation work and features of safety on this system. Stereopticon views of "Safety First" and working exhibit of safety signal system. Grand Prize.

B. F. STURTEVANT COMPANY, HYDE PARK, MASS. Sturtevant heating, ventilating and dust collecting system. Guards used on emery wheels. Gold Medal.

FRANK STUTZMAN COMPANY, WILLIAMSPORT, PA. Safety heads for jointers, planers and base planers. Gold Medal.

SUBMARINE DIVING & RECOVERING COMPANY, NEW YORK. Diving apparatus. Silver Medal.

TRAVELERS' INSURANCE COMPANY, HARTFORD, CONN. Exhibit of dangerous equipment and cables, ropes, steam pipes and boilers, etc., which have caused dangerous and fatal accidents, and should not be allowed to be in operation, but should be condemned by regular inspections. Grand Prize.

TROEGERLITH TILE COMPANY, NEW YORK. Fireproof compositon flooring. Honorable Mention.

UNION PACIFIC SYSTEM. Exhibit of photographs showing accident prevention, safety and welfare work of this company and signal systems. Grand Prize.

WELDLESS CHAIN COMPANY, LTD., NEW YORK. Weldless chain. Gold Medal.

WEST DISINFECTING COMPANY, NEW YORK. Exhibition of disinfectants and sanitary appliances, steam sterilizer, the West Sanotor Closet. Grand Prize.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, EAST PITTSBURGH, PA. Exhibit of models, machines equipped with safeguards, and photographs showing the accident prevention and welfare work in operation in this company. Grand Prize.

T. A. WILLSON & COMPANY, READING, PA. Exhibit of The Willson Safety Glass, The New Willson Goggle and The Albex Eye Protector. Grand Prize.

WORKMEN'S COMPENSATION SERVICE BUREAU, NEW YORK. Exhibit of the original drawings for the "Universal Safety Standards." Gold Medal.

## ELASTITE PAVING JOINT.

The Philip Carey Company is placing on the market a new product, the Elastite Paving Joint. It consists of a heavy body of special asphalt compound, sandwiched between two layers of a special grade of asphalt-saturated wool felt, the whole being firmly bonded together by an original combining process. The feature of this joint is the increased compressibility secured by increasing the volume of the asphalt compound and keeping it in a solid body instead of distributing it throughout the joint in several thinner layers. It is adapted to all classes of paving. This joint can be used effectively in concrete bridges, viaducts, roofs, reservoirs, in fact, in any construction work where it is necessary to provide for expansion of the material.

## DRAEGER SELF-RESCUER.

A unique little device which is commonly called a helmet, although this particular one is not a helmet at all, has just been introduced and is known as the Draeger Self-Rescuer. The machine got its name from the fact that it has assisted miners in rescuing themselves after an explosion. In cases of this kind, it is adjusted quickly, and the miner may penetrate the deadly "after-damp" and return to the outside in safety.

Because of its lightness and simplicity, it has greatly interested practical gas men, and in spite of the fact that it has been on the market but a few months, a number of the larger plants throughout the country have already installed them.

The Draeger Self-Rescuer produces a complete seal from outside air without using a hood, and in this way the wearer has no encumbrances around the head. The little machine weighs about 6½ pounds, and may be wrapped up in a package no larger than a woman's handbag. It is put into use in a few seconds and can be used by the most ignorant laborer without previous training. It is inexpensive in first cost and in upkeep.

A laborer may remain in the most poisonous gases for 30 minutes with this little machine and have no signs of being "gassed."

The respired air passes over the granulated caustic potash as it passes through tube L in passing down to breathing bag A. Here it meets fresh oxygen from cylinder S, and when the wearer again inhales the mixture it is enriched with oxygen to replace that which was consumed on the previous breath, returning again through potash cartridge P, thence through tube L to the lungs of the wearer. In this manner the respired air is purified two different times, and the result is that the carbonic acid gas of respiration which would otherwise be very annoying as well as dangerous to the helmetman is reduced to less than one-half of 1 per cent.

The Self-Rescuer is handled by the Draeger Oxygen Apparatus Company of Pittsburgh, manufacturers of the Pulmotor. Both machines will be demonstrated at the Minneapolis Convention at Booth No. 62.

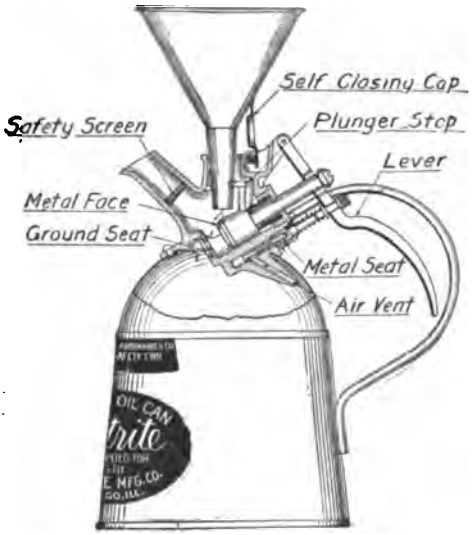
## JUSTRITE FIRE EXTINGUISHER.

The Justrite Manufacturing Company has put on the market a new one-quart fire extinguisher, which bears the label of the Underwriters' Laboratories, Inc., under the direction of the National Board of Fire Underwriters.

The Justrite Extinguisher is made of seamless brass, and is compact and simple in operation. A small crank, controlled by a pawl and ratchet, is attached to the discharging head. This crank is operated in a clockwise direction, forcing the liquid from the nozzle in a strong, steady stream. A seal is provided connecting the nozzle and handle, indicating whether or not the device has been tampered with. By turning the crank a steady stream is directed any distance desired up to 35 feet. An original feature of the Justrite extinguisher is that it is furnished with an indicator showing the quantity of fluid in the extinguisher.

The manufacturers guarantee to replace any Justrite Extinguisher found imperfect in material or workmanship. It is an ef-

ficient fire extinguisher for fires resulting from ignition of dangerous volatile oils, such as gasolene, benzine, kerosene, turpentine, naphtha, alcohol, etc. Fires of oily waste, rags.




and dust, originating from spontaneous combustion or otherwise, are extinguished by the Justrite in the incipient stage. This extinguisher can also be used successfully on electrical fires.

This company manufactures also oily waste cans for factories, etc., which bear the underwriters' label, and also safety cans for the using and storage of explosive and inflammable

liquids, such as gasolene, benzine, kerosene, turpentine, naphtha, alcohol and other volatile liquids. These cans bear the underwriters' label.

## SAFETY FROM FIRE.

The National Automatic Sprinkler Association has issued a 32-page booklet, profusely illustrated, which sets forth in facts and figures the economy and safety secured by automatic sprinkler protection. The staggering losses due to the fire destruction each year in this country are presented impressively. Automatic sprinklers are a necessity wherever protection against fire is desired.

## NEW WILLSON GOGGLE.

T. A. Willson & Company, Inc., is announcing an addition to its line of safety goggles. This is a new light goggle for grinders and others who need protection from light particles. In designing this goggle the elements of comfort to the wearer, adjustability to fit any face, sanitation and lightness have received careful attention. This goggle is fitted with fine quality lenses.

The Willson Company has also just issued a new circular on shop protection glasses with a view to helping the men in selecting the proper glass for different requirements. The importance of getting the right goggle should not be overlooked. Every effort should be made to provide the most suitable goggle for meeting service requirements.

The object of the circular is to emphasize these principles.

## INSPECTION OF SAFETY GOGGLES.

The Julius King Optical Company is notifying the industrial plants, with which it is doing business, of the great importance of a daily inspection of safety goggles, and suggesting that the toolman, foreman or sub-foreman have the care of such inspections. He should be sufficiently familiar with the construction of eye protectors to know at a glance whether or not they are in perfect condition.

It is customary to replace broken or mushroomed tools, but it is more important to know that safety spectacles are checked up to their highest efficiency.

It should be the absolute duty of the man in charge to know the following:

1. That the frames are not bent out of shape; that is, one lens higher than the other, nor so low in front of the workman's eyes as to cause him to constantly look over the frames.
2. That the screws, holding the lenses, are not loose.
3. That the side screens and temples are not damaged or bent.
4. That the lenses are not cracked, chipped, or pitted with emery.

Any of these defects can be seen without removing the goggles from the face or causing any delay in the work.

Defective goggles should be replaced and the old ones laid aside for repairs. Workmen should be impressed with the importance of taking proper care of the goggles that have been furnished to them by the plant.

No phase of the accident prevention problem is more important than the proper care and regular inspection of tools. The safety inspector, having charge of the department and on whom the principal responsibility rests, should *know* that all safety goggles worn by the men are safe.

# SAFETY ENGINEERING

Vol. 29 FEBRUARY, 1915 No. 2

*ANNOUNCEMENT.*—SAFETY ENGINEERING *has assumed the subscription contracts of "Protection Engineering." This magazine is to be sent hereafter to the subscribers of "Protection Engineering," beginning with the March number.*

# *Roebling Plant in Trenton Built to Burn*

*The Roebling plant in Trenton, N. J., destroyed by fire on January* 18, 1915, *furnishes another illustration of the carelessness of big manufacturing concerns with respect to fire hazards. The Edison plant, burned in December, is even more historic in a similar way. In both cases the areas were not subdivided as underwriters had recommended. Windows generally were not protected with wireglass. Automatic sprinklers were not in place. In contrast with the Edison and Roebling experiences is the case of the Sherman Envelope Company in Worcester, Mass., which was saved by automatic sprinklers, according to the opinion expressed by the chief of the Worcester Fire Department.*

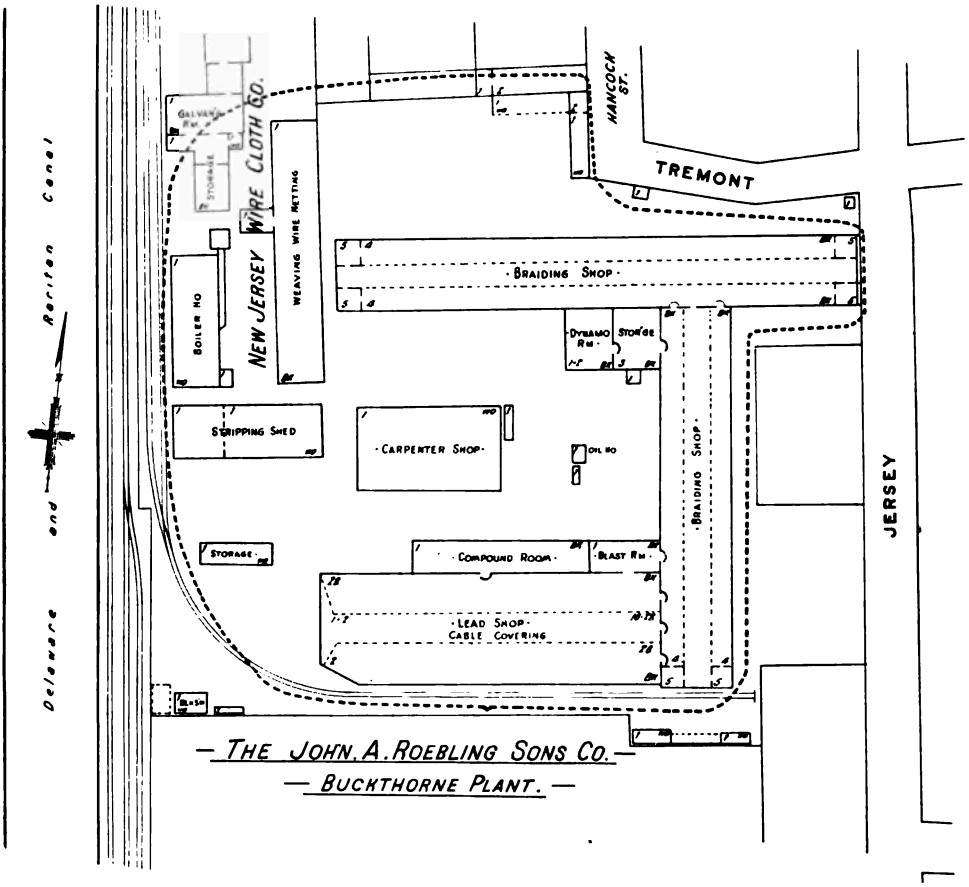
THE insulated wire department of the plant of the John A. Roebling's Sons' Company, in Trenton, N. J., known as the Buckthorne plant, was destroyed by fire in the evening of January 18. The loss was estimated at about $1,500,000, including the loss on finished product. About 300 workmen were in the buildings, on the night shift, when the fire was discovered. They were able to escape without injury, but were not able to use effectively the fire-fighting apparatus.

The fire ran along a part of adjoining property, destroying fifteen houses. The manufacture of insulated wire was a hazardous process through the use of combustible substances.

The buildings that the department occupied were constructed about thirteen years ago, on about eight acres of ground. One of the buildings was five stories in height. The management declared that the buildings were equipped with the latest modern fire prevention and fire-fighting apparatus; that the stairs were fireproof and lined from cellar to roof with clinched tin; that self-closing doors were in position; that the elevators were protected; that standpipes, chemicals and hose carts had been provided.

The buildings had six emergency fire escapes on the outside and seven interior stairways. The structural conditions were inspected by the State Department of Labor about four weeks previous to the fire, and the report was that the apparatus was the best obtainable.

The buildings were without automatic sprinkler protection. From the viewpoint of insurance engineers, the subdivision of area was poor. The fire doors had been considered sub-standard, and it was understood that the placing of new doors had been recommended. The construction of the buildings was considered weak, consisting of wood, steel and cast iron. The equipment for fire protection consisted of inside hose, fire alarms, watchmen, fire buckets, fire brigade and hydrants in the yard; in fact, everything for fire protection except automatic sprinklers.




**Ground plan of the insulated wire department of the Roebling plant in Trenton, N. J., showing area of the fire on January 18, 1915.**

The opinion of engineers was that the fire divisions were weak and that good fire walls of the southern braiding shop should have saved the northern braiding shop and the lead shop.

The wireglass windows, that had been installed at fire escapes under the provisions of the labor law of New Jersey, stood the test of the fire.

The fire was the largest in the history of the city, and it was the first time that aid was asked from other cities. Camden sent two engines, with 22 men and 2,000 feet of hose, but the fire was under control when the apparatus arrived in Trenton.

The fire started at about seven o'clock in the southern braiding shop of the plant, and the flames spread rapidly, although the members of the fire department arrived quickly at the burning buildings. It was a spectacular fire; the whole city was illuminated. Some of the sparks were carried more than a mile from the plant.

The roof of the Jersey street side of the structure was the first to fall, carrying the floors and machinery to the ground. The tower of the structure at Jersey and Tremont streets took fire soon afterward.

A chemical engine was trapped at one time between the plant and the building of the Home Rubber Company. Unable to move by its own power, it could not be budged by a team of horses. A locomotive was used to withdraw the machine from the mire after planking had been placed in Cass street.

Early in February a report was that

**Wireglass window, with solid metal frame. Roebling plant.**

the fire had been started by Werner Horn, who attempted to blow up the Canadian Pacific railroad bridge over the St. Croix River. Detectives in Trenton had heard that Horn was in the city on the day of the fire. One of the Roebling plants was manufacturing trace chains for artillery wagons and other war supplies at the time of the fire. Because much interest had been aroused over the contract for war supplies, a suspicion was that the fire was incendiary.

### EFFICIENCY OF AUTOMATIC SPRINKLER SYSTEMS.

The efficiency of automatic sprinkler systems was demonstrated in the Sherman Envelope Company's plant in Worcester, Mass. In the temporary absence of the watchman, one Sunday morning, two Rockwood automatic sprinkler heads operated and extinguished a fire. The fire department was called by the automatic operation of the system. When the firemen arrived the fire was under control.

Chief Wesley N. Avery, of the Fire Department, said that automatic sprinkler systems in factories, stores and office buildings in Worcester had saved many thousands of dollars' worth of property in the past ten years and that the executive officials of the Sherman Envelope Company had not stopped praising the sprinkler system in the company's plant.

"Another example of the efficiency of automatic sprinkler systems," the chief said, "could be cited in the case of a fire in the store of the Barnard, Sumner &

**Wireglass windows at a fire escape. Roebling plant.**

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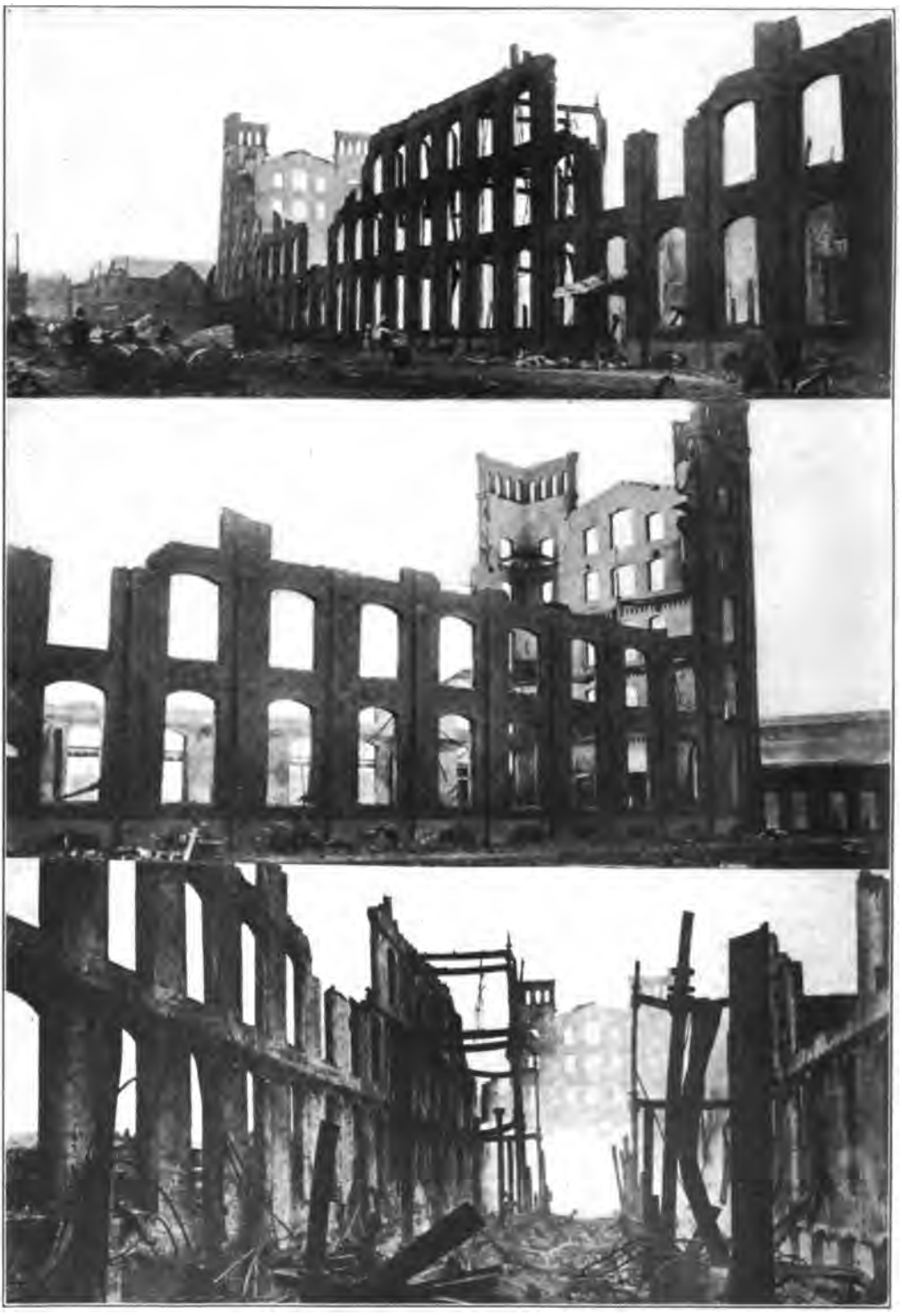

**Ruins of the main building of the insulated wire department of the Roebling Plant in Trenton, N. J.**

Putnam Company. A fire there one morning would have caused the biggest loss in Worcester in years, if the sprinkler system had not prevented it from spreading. That system had been in the store 13 years, waiting for the chance that it got that morning. It was waiting for a fire to start anywhere in the store and was ready when emergency arose.

"A sprinkler system might have prevented the loss of the Watson plant in Leicester. The factory was burned to the ground; practically all of the employes are out of work; the owners have lost money, and they will continue to lose it while the shop is closed.

"The cost of installing a system is not very great, I believe. The added protection it gives, the absence of worry over a fire starting in a building and getting headway before it is discovered, and the many features of the automatic sprinkler systems, make me wonder why more buildings are not equipped. See what it means to the man who has a sprinkler system in his factory, store or office building. He can go home at night and go to sleep, feeling certain that he is protected from fire, because the sprinkler system is waiting to put out any fire that may start.

"Not only does it mean an excellent method of protection from fire, but it means that within five years a system can be made to pay for itself. Afterward it will operate without cost. In buildings where the sprinkler systems have been installed, the cost of fire insurance is always lower."

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### CLOSE SHAVE IN A BOX FACTORY.

A fire in the factory of the Lynn Box Company demonstrates the hazard of frame factory buildings. The fire, believed to be of incendiary origin, started in a storeroom in the southwest corner of the building. Without a moment's notice it shot out through the partitions, and to the second floor, from which 23 girls escaped with difficulty. Fire officials claimed that only the heavy rain of the day before prevented a conflagration, the roofs of adjoining houses being too wet for the sparks to ignite.

# NO FIRES FROM RATS AND MATCHES

*By F. V. D. Cruser.*

[An impression prevails in many quarters that rats and mice start fires by gnawing the heads of friction matches. To correct that impression, considered erroneous by chemical engineers and experts in the manufacture of matches, experiments have been conducted with rodents and the various types of matches. The particulars of the results appear in this article.]

MOST people today are particularly interested in the methods of safety and the conservation of life and property, and never before has so much attention been given to accurate, scientific data. This is as it should be, for if we know the causes of accidents they may sometimes be avoided or prevented, and if we know what causes waste we may eliminate such waste. So with fires, which destroy millions of dollars of property value every year, more attention is being given yearly to the causes.

Unfortunately, often, in reporting data, information is given of very little value and sometimes based purely upon the imagination. This is the case with rats and matches, as scientific data have proven. Quite often we see the claim made that rats frequently cause fires, due to the gnawing of the heads of matches and igniting them. The writer, being more or less connected with the technical side of match manufacture, became sufficiently interested in this subject to conduct a series of experiments in a thorough and scientific manner, in order to prove whether there was any truth in this claim.

A large number of rats and mice were caught at different times and placed in cages (four sides of which were of tile, the ends being of wire), and the cages were located in quiet places in a cellar. The animals were kept for a certain length of time, without food or water, and were then given a counted number of thoroughly seasoned matches and a small quantity of straw. No food or water was placed in the cages. Exact records were kept of the tests, the results of which are given in the accompanying table:

TESTS ON RATS.

| Number of Test | Time allowed for animal to become hungry (in days) | Kind of matches placed in cage | No. of matches placed in cage | Time from introduction of matches and straw to death of animal (in days) | Signs of fire | Signs of gnawed match heads |
|---|---|---|---|---|---|---|
| 1 | 3 | Double Dip | 150 | 2 | None | None |
| 2 | 3 | " | 150 | 2 | " | " |
| 3 | 3 | " | 150 | 5 | " | " |
| 4 | 3 | " | 150 | 3 | " | " |
| 5 | 3 | " | 150 | 3 | " | " |
| 6 | 2 | " | 150 | 3 | " | " |
| 7 | 2 | " | 150 | 1 | " | " |
| 8 | 3 | Single Dip | 150 | 2 | " | " |
| 9 | 3 | " | 150 | 3 | " | " |
| 10 | 3 | " | 150 | 3 | " | " |
| 11 | 2 | " | 150 | 2 | " | " |
| 12 | 2 | " | 150 | 3 | " | " |

TESTS ON MICE.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 3 | Double Dip | 150 | 2 | None | None |
| 2 | 3 | " | 150 | 1 | " | " |
| 3 | 2 | " | 150 | 2 | " | " |
| 4 | 2 | " | 150 | 3 | " | " |
| 5 | 3 | Single Dip | 150 | 5 | " | " |
| 6 | 3 | " | 150 | 3 | " | " |
| 7 | 2 | " | 150 | 2 | " | " |
| 8 | 2 | " | 150 | 2 | " | " |

This series of experiments showed that rats and mice would starve in the presence of matches without attempting to eat the match composition or gnaw the splints.

To demonstrate more thoroughly the fallacy of the claim, the experiments were continued with a cage of much greater dimensions—more than six feet square. The animals in the cage, in some instances, were fed for a period of about one month before any tests were conducted with them, so that they would become very familiar with their surroundings and act in a normal manner. The experiments covered a period of more than eight months, the results of which are shown in this table:

Series A. (Without food or water.)

| Test No. | Kind of matches | Time from introduction of matches to death of animals (in days) | Signs of fire | Signs of gnawed match heads | Remarks |
|---|---|---|---|---|---|
| 1. | Phosphorus single dip. | Rat No. 1—3 days<br>" " 2—4 "<br>" " 3—5 " | None | None | Rats No. 2 and No. 3 ate part of rat No. 1 before it was found dead. |
| 2. | Phosphorus double dip. | Rat No. 1—2 days<br>" " 2—4 "<br>" " 3—6 " | None | None | Rat No. 1 was killed and eaten by the other rats. |
| 3. | Sesqui double dip. | (1 rat)—2 days | None | None | |

Series B. (With water, but without food):

| | | | | | |
|---|---|---|---|---|---|
| 4. | Phosphorus single dip. | Rat No. 1—1 day<br>" " 2—5 days | None | None | |
| 5. | Phosphorus double dip. | (1 rat)—2 days | None | None | |
| 6. | Sesqui double dip. | (1 rat)—3 days | None<br>None | None<br>None | |

Series C. (With food and water for a period, and then starving until dead.)

| | | | | | |
|---|---|---|---|---|---|
| 7. | Phosphorus double dip. | Rat No. 1—20 days<br>" " 2—28 "<br>" " 3—31 "<br>" " 4—32 " | None | None | Rat No. 1 was killed and eaten by the others. Rats were fed for 20 days, at end of which time all food was removed from cage, but animals were given water. |
| 8. | Sesqui double dip. | Rat No. 1—30 days<br>" " 2—37 "<br>" " 3—42 "<br>" " 4—42 " | None | None | Rats were fed for 23 days, at end of which time feeding was discontinued and all food removed from cage. Rat No. 1 was eaten by the other rats during the night. |
| 9. | Phosphorus single dip. | Rat No. 1—41 days<br>" " 2—44 "<br>" " 3—40 " | None | None | Rat No. 2 was gnawed by other rats during the night. Rats were fed for 1 month and 8 days, after which they were starved. Rat No. 2 was slightly gnawed by the other rats during the night. |

Note: In conducting the experiments the endeavor was made to remove the rats as soon after they had died as possible, so as to prevent their being eaten by the other rats.

At times, when using the big cages, several animals were placed together in a cage, and after the starving process was started it was necessary to watch them closely as they would kill each other for

food, ignoring the matches in the cage.

The results of the tests, which are probably more exhaustive than any others ever conducted, prove conclusively that rats and mice will starve in the presence of matches. There is, therefore, not the slightest truth upon which to base a claim that fires are caused by rodents gnawing matches.

An investigation was conducted by Underwriters' Laboratories, Inc., some time ago. Considering the results, A. H. Nuckolls, chemical engineer of the laboratories, was inclined to the opinion that there was very little danger of fires being caused by the gnawing of matches by rats and mice, particularly with the types of matches manufactured in the United States at present. The paste used in the manufacture of paper boxes as holders of matches is mentioned at times as a possible inducement to rodents to gnaw the boxes, but there seems to be no basis for the statement that rodents like to eat or gnaw the heads of matches.

The report of the investigation had data to indicate that the types of matches that are labeled now by the Underwriters' Laboratories, Inc., are not liable to ignition by the gnawing of heads by rodents. The experiments showed that the rodents, when caged, died of starvation, without attempting to gnaw the heads of matches where they were confined.

Extracts from the report on the investigation:

Types of matches:

Type A. Strike-on-box match.

Type B. Inert bulb protected tip match.

Type C. Protected single-head match.

Type D. Inert bulb ordinary tip match.

A direct test was conducted by placing seven rats in a cage, made of wire netting. Straw and water were placed in one part of the cage and matches of types A, B, C, D, and "parlor" in another. The test was carried on during four days.

The rats were normal in size and appearance and showed no signs of sickness. On the second night of confinement one of the number was killed. During the last night of confinement one of the remaining rats was killed and eaten by companions. No evidence of the gnawing of the heads or splints of any of the matches in the cage was obtained.

The results of the cutting tests show that types A, B, and C are safeguarded sufficiently in respect to ignition by friction to make it difficult for a rat or mouse to ignite the composition by gnawing. The bulb of type D is practically non-ignitible by gnawing. It is considered improbable that a rat or mouse will gnaw the phosphorous tip, which is highly irritating and poisonous to animal life.

The experiments, while not conclusive, seem to show that rats even when starving do not regard matches of the types in question as an article of food.

The object of another test was to determine whether or not hungry rats and mice in the presence of white phosphorous parlor or double dip matches would ignite the matches.

Rats and mice were caught in wire-netting traps and transferred to cages 17½ x 6½ x 6½ inches high. The cages were placed in a quiet place. Each animal was kept a determined length of time without food or water. It was then given a counted number of thoroughly seasoned white phosphorous parlor or double dip matches and a small quantity of straw. No food or water was at any time placed in the cages. Records were kept as to the date of capture, date of introduction of matches and date of death of animal, as well as the condition of the matches when the matches, straw and dead animals were removed.

## CEMENT SHOW.

The eighth Cement Show in Chicago on February 10-17 had 150 exhibitors, who occupied 60,000 square feet of floor space to display $1,500,000 worth of exhibits. Year after year the show has been more useful in many ways for contractors, engineers, architects, builders, dealers in building materials and manufacturers of concrete products. Reinforcing systems, metal lath, wood and metal forms, and steel sash were among the exhibits. Coincident with the show were the conventions of the American Concrete Institute, the American Concrete Pipe Association, the National Builders' Supply Association and the Illinois Lumber & Builders' Supply Dealers' Association.

# FLIMSY CONSTRUCTION OF HOTELS

## DESTRUCTION BY FIRE OF THE ESSEX IN SALEM AND TWO SUMMER HOTELS AT SEASIDE RESORTS.

THE danger of occupancy, for hotel purposes, of the upper stories of a building that has mercantile establishments as tenants of the first and basement stories is indicated at frequent intervals in the fire record of hotels.

That hotels had been notorious for disasters due to fires has been a matter of common knowledge during many years, and it is a matter of knowledge in the minds of fire protection engineers that the safety of life in hotels is not assured by the conditions that exist in many of them now.

The flimsy construction of a building in Salem, Mass., the third and fourth stories of which were occupied by the Essex Hotel, is indicated by the accompanying photograph of the ruins of the top story. The dangerous hazard is indicated by the photograph of the damaged interior of the department store in the first story and the basement.

Ninety guests and twenty employes in the hotel escaped when the first warning was given by firemen after fire started in the basement of the department store early in the evening of January 21, 1915. Ten of the guests, who defied the orders of the firemen and remained, were trapped in the building when flames swept through the stairway. They were rescued by firemen on ladders. Six of the rescued persons were women. Evidently fire escapes had not been provided for the part of the building used for hotel purposes.

The destruction of the building was evident within half an hour, yet some of the guests were persistent in their defiance of the orders of the firemen to go to the street.

The fire started in the bakery in the basement of the department store of Cobb, Bates & Yerxa, spread rapidly through the building and during five hours endangered the adjoining building, occupied by the biggest department store in the city. A fire wall separated the buildings. About 100 yards distant a big conflagration stopped in June, 1914.

The narrowness of Essex street hampered the firemen in the use of their apparatus. It was impossible to raise aerial ladders. Several of the firemen were overcome by smoke from the burning of bags of charcoal in the basement of the building. The chief of the fire department was overcome when he tried to find a way through the department store and the mayor of the city assumed charge of the firemen.

The fear was that the remaining part of the retail section of the city would be destroyed, and assistance was called from Boston, Chelsea, Lynn, Beverly, Peabody, Marblehead, Swampscott and Everett. The departments in some of the cities sent automobile apparatus to Salem.

The wind was light, but the sparks that flew from the burning roof of the building menaced the surrounding property. For a time Peabody Museum, that contains a valuable collection of antique articles, was threatened. The ambulance corps of the Second Corps Cadets and Company H of the Eighth Regiment responded to the general alarm and aided the firemen.

This fire, which alarmed Salem, destroyed a considerable amount of property and jeopardized many lives, would have been confined to the limits of a small blaze if the buildings had been of safe construction and if an automatic sprinkler system had been in position to control the fire at the point of origin.

As guests are not protected in advance of fire by safe construction, automatic sprinkler installations and other fire fighting equipment, it follows logically that the provisions for guests to escape in case of fire are inadequate in many buildings and are lacking in other buildings. In the case of a fire in a hotel in Chicago several persons were injured in a panic on a narrow fire escape. Other persons jumped from windows and were injured. The casualties reported were four dead and four seriously injured.

FIRETRAP RESORT HOTELS.

The flimsy construction of resort hotels is a matter of common observation. The destruction of such buildings is recorded at intervals between seasons. The Ocean Manor House, formerly the Nanapashemet Hotel, Marblehead, Mass., was destroyed by fire on October 21, 1914. Built about 30 years ago, it was a four-story wooden structure and a prominent landmark at the harbor. Firemen from nearby places had difficulty in preventing the flames from spreading to surrounding cottages. Two explosions occurred within the building soon after the fire engines arrived. The structure was split in two by the explosions, and the embers fell on the cottages.

In the case of the destruction of the Sea View Hotel Gloucester Neck, Mass., enough of one corner of the building was unburned to indicate the flimsy construction.

Ordinary observation is that hotels in many instances are without appliances to fight fire with. In many cases the use of a hand chemical fire extinguisher or a

HOTEL FIRE IN SALEM, MASS.

**(Top) Top story of Leavitt block, occupied in part by the Essex Hotel. (Bottom) Interior of the department store in the first story and basement. Fire started in the basement bakery of the store and swept quickly through the building.**

**SUMMER RESORT HOTEL FIRES.**

**(Top) Ruins of Sea View Hotel, Gloucester Neck, Mass. (Bottom) Ruins of Ocean Manor House, Marblehead, Mass.**

line of hose can avert a loss of property. Some hotel proprietors have the tendency to scrimp the number of hand chemical fire extinguishers necessary for a proper equipment, particularly in summer resort hotels.

The seekers of pleasure and health at seaside and country resorts in the summertime are entitled to protection against the casualties that accompany fires in the flimsy structures used for hotel purposes. Water supply may be nearby, but facilities should be adequate to draw upon it for use in fighting a fire.

The deficiencies that make hotels "firetraps" are avoidable. Progressive proprietors of hotels, realizing the burden of responsibilities in furnishing accommodations for guests, have tried to make their houses safe; but other proprietors, men of a certain type, are disinclined to do anything unless the law compels them to do something in the way of safety.

Since January 1, 1915, fires in 82 hotels in cities and small towns have been recorded; since September 1, 1914, in 23 resort hotels.

# SAFEGUARDING A FIFTY-MILLION-DOLLAR EXPOSITION FROM FIRE

*By Howard G. Hanvey.*

ACCORDING to experts on fire risk there is not an area in the world that is guarded as safely against conflagration as California's $50,000,000 Panama-Pacific International Exposition. On the 635 acres of highly inflammable structures practically every known agent for fire fighting has been installed, from water to chemicals and from high-powered motor apparatus to automatic sprinklers and alarms.

The exposition fire-fighting system is a unit, independent of San Francisco's system from the standpoint of everything except water. High-pressure and low-pressure mains on the exposition grounds tap those of the city's system. With equipment the exposition system represents a valuation of more than $500,000. In view of the fact that great disasters have gone hand in hand with expositions in the past, nothing has been left undone in fire prevention at the exposition grounds.

Three modern up-to-date fire engine houses, harmonizing in architecture with the architectural scheme of the exposition, are on the grounds.

J. F. Layden, an experienced fire fighter, has charge of the exposition department as chief. At present there are 100 men, the pick of the city's department, comprising seven companies. After the formal opening of the exposition the number is to be increased. The men are put through drills to acquaint themselves with the grounds and the intricacies of the palaces and other structures.

The exposition's motor fire apparatus is valued at $100,000, and represents, according to authorities on the subject, the very latest in equipment of that character. At the headquarters station are housed an aerial truck, a pumping engine, a hose wagon and a squad wagon, all motor driven. The aerial truck is equipped with 85-foot ladders. The squad wagon, in addition to hose and chemicals, carries a crew of firemen, the purpose being to get to the scene of every fire in the quickest time possible with a force of men trained to take the lead in either extinguishing fire or preventing communication to a larger area.

At No. 2 firehouse on the "Zone" are a pumping engine, a hose wagon and chemical. At No. 3 firehouse are a ladder truck and engine and hose wagon. The total equipment for the three houses consists of three pumping engines, two trucks, one chemical and one squad wagon, all motor driven. The equipment may be increased after the opening of the exposition.

In a test recently a motor apparatus on the "Zone" ran through to the westernmost extremity of the grounds in one minute and two seconds.

The exposition taps the city's high-pressure system in 8- and 16-inch mains, drawing on the 10,000,000 gallons of fresh water stored in the Twin Peaks Reservoir. High-pressure hydrants are located 200 feet apart throughout the grounds, and at these 200-pound pressure has been registered.

Besides the high-pressure system there are several miles of mains carrying the ordinary water supply which, in comparison with the city's emergency system, is known as "low pressure." The hydrants of these are situated 20 feet distant from the high-pressure, to be used by motor fire engines for increasing the nozzle pressure of the streams.

As in the city's system, in case of the failure of the fresh water supply in a great emergency, the exposition can draw on the salt water pumping auxiliaries at Fort Mason and in Townsend street. Supplementary to these are two manifolds, one at the exposition ferry slip, and another at Yacht Harbor, into which the fire tugs Scannell and Sullivan can pump. The manifolds connect with the system of mains on the grounds, and tests have shown

that, should all other means fail, a tremendous pressure can be developed from the two tug manifolds.

There are 194 high-pressure hydrants, with double valves, and the same number of "low-pressure" hydrants. In addition there are 95 3-inch hydrants on the roofs of the main palaces, and batteries of 6-inch swinging monitors. In Machinery Palace are 21 hydrants on the 100-foot level. At all hydrants in the buildings and on the roofs are equipments of hose. Within each of the palaces are six 40-gallon chemical tanks on wheels and a large distribution of 3-gallon fire extinguishers.

A model working exhibit in the Palace of Liberal Arts serves as the fire alarm signal bureau. There are 102 fire alarm boxes on the grounds, an alarm from any one of which goes into the exposition signal station. No alarm on the exposition grounds communicates with those of the city's system, excepting one vicinity alarm which is sent in automatically, calling city equipment to the exposition gate nearest the scene of the fire. Besides this signal system there is an auxiliarv automatic system, known as the Aero alarm. There are seventy-six miles of this system through the main exhibit palaces. It consists of hollow wire tubing. Heat from a fire expands the air in it and sends an alarm.

Automatic fire sprinklers in the palaces and curtain sprinklers along the top walls give added protection to the big structures.

The exposition fire protection system has been installed under the direction of W. M. Johnson, chief engineer of the Department of Water Supply and Fire Protection and engineer of the National Board of Fire Underwriters. An advisory committee, consisting of George W. Booth, of the National Board of Fire Underwriters; F. H. Porter, manager of the Fire Underwriters' Inspection Bureau, and George M. Robertson, chief engineer of the Board of Fire Underwriters of the Pacific, has supervised the development of the fire prevention system.

Like the forest ranger on his mountain top, sweeping the Sierran timber for the smoke of a fire, an exposition guard stands day and night at the top of the Tower of Jewels, watching the forest of roofs and domes for a possible blaze aloft, which might not be seen from the ground below.

This is the only use made of the tower, outside of its purpose as the central architectural feature of the exposition and its functions as a principal unit in the scheme of illumination. There are elevators in the structure, but they are not intended for use by visitors. The elevators are there principally as a matter of fire protection, for use by firemen in the event of a possible blaze within the tower, or to enable them to use it as a point of vantage from which to fight a fire in any of the surrounding buildings.

## FIRE INSURANCE LECTURES.

The course of lectures on fire insurance under the auspices of the Insurance Library Association of Boston is to be completed this month. The object of the lectures was to aid members of the association who might wish to prepare themselves for the examinations of the Insurance Institute of America. Each subject had a list of references, recommended for collateral reading, and as the list was not long the students were urged at the beginning of the course to make themselves familiar with at least one of the references. The scope of the course was: Plan Drafting to Scale, Including Plan Notations; Electrical Hazards, Woodworking Hazards, Breweries, Correspondence, Fire Protection, Public and Private; Standard Policy, Clauses and Forms; History and Philosophy of Fire Insurance Rating.

## EDISON BUYS WIREGLASS.

A test of wireglass windows was held at the plant of the Edison Company, West Orange, N. J., early in February. Following the test a large contract was let for wireglass windows to protect the buildings, new and reconstructed since the recent fire. Mr. Edison is following the advice of his friend, Henry Ford, to install wireglass windows as firestops.

# STANDARDIZATION OF PUBLIC FIRE FIGHTING APPLIANCES

*By F. M. Griswold, General Inspec tor, Home Insurance Company.*

IN this age of advanced practice in the mechanic arts, under the influence of which every effort is being made to secure standardization of all commercial devices, apparatus and machines in order to insure complete interchangeability of component parts, it is surprising that the manufacturers and the purchasers of fire-fighting facilities continue to lag behind in so essential a particular, seemingly remaining content to follow a "happy-go-lucky" course of individual "hit-or-miss-fit" design, without any thought of the probability of having to call upon neighboring communities for aid in the emergency of a wide-spreading fire which is passing beyond the control of their local fire-fighting equipment, nor do they appear to realize the fact that in seven cases out of nine necessitating calls for assistance under the prevailing conditions of individual choice of appliances, that the community responding to the cry, "Come over into Macedonia and help us," will bring apparatus so different in design and dimensions as to prove non-interchangeable with the local devices and thus render the proffered aid nugatory.

How long must be the time, and how often must our communities suffer from conflagrations of such magnitude as to necessitate a call for outside assistance, before our city and town authorities will realize how absolute is the inter-dependence of one community with others in times of trial and disaster, and that each therefore be prepared and ready to afford efficient assistance by providing public utilities which will prove of value to all concerned through facility of interchange.

The accomplishment of this much-needed harmony in fire-fighting appliances can be secured only through their standardization, in order to insure that reliable and efficient interchange with appliances of like character which is so highly essential in fire equipment, and it appeals to the writer that the most important of these essentials of equipment calling for standardization is that of hose couplings which form one of the most necessary adjuncts in the fire department facilities.

In regard to this particular device it is gratifying to know that a standard has been established through the sanction and approval of many public bodies of wide influence, under whose supervision and control such public utilities are specified and installed.

This coupling is known as the "National Standard," the specifications for two-and-a-half-inch hose calling for a coupling having an outside diameter over male end thread of 3 1-16 inches, with 7½ threads to the inch, thus producing a device of such wide range of adaptability as to insure a safe and serviceable interchange with other screw couplings varying in outside diameter from 3 1-64 inch to 3 3-32 inches where either 7, 7½ or 8 threads to the inch prevail.

The procedure of converting these non-standard but adaptable sizes to interchange with the National Standard, consists in the use of a tap or die with which to either reduce the diameter of the male end or to increase that of the female end, as may be necessary, in order to insure a safe and reliable joining of these differing dimensions. The expense incident to conversion is practically nominal, being in most instances confined to the cost of procuring a tap and die having the same number of threads to the inch as has the coupling which is to be converted; the usual cost of a tap and die of the character indicated is seldom in excess of $25, and no additional cost for the operation in making the change from adaptable to standard need be incurred when the work is done by the em-

ployes of either the fire department or that of the waterworks force, under the direction of a master mechanic.

The National Standard Coupling "is not patented, nor is it patentable; it is but a simple adoption of a common means toward the elimination of present indefensible conditions which cry aloud for the abolition of the incompetence, ignorance and carelessness which now control the selection and installation of these vital public utilities."

In view of the fact that the conversion of non-standard but readily adapted couplings to interchange with the National Standard is a matter of very small cost, not calling for specially skilled help in the operation, it is difficult to understand why public authorities, supposedly having the best interest of the public under their care and control, can justify further delay in the adoption of this well established and approved means of protection against the, at present, inexcusable disasters due to spreading fires.

It is to be most devoutly hoped that the day of universal standardization of these vitally essential public utilities may not be delayed through the false assumption that the cost and trouble of making the change will be other than nominal in a preponderating number of cases under present knowledge of general conditions as existing throughout this country.

In illustration of the dire troubles due to the many variations in hose couplings dimensions and design, let us cite an example, by supposing that Rochester, N. Y., has a big fire which threatens to "get away" from its own department equipment, and a call for help is sent to Albany, Buffalo, Rome and Syracuse, as has more than once been the case in the past; then the responding cities would find Rochester with couplings showing an outside diameter of either 3 inch or 3 1-32 inch (both sizes being of record) with seven threads to the inch; both Albany and Buffalo would come in with hose couplings of 3 1-16 inch diameter and eight threads to the inch, while Rome would show up with couplings of 3 3-16 (or 3⅛ inch) with eight threads and Syracuse would come along with couplings of 3⅛ inch (or 3 3-32 inch) having eight threads to the inch, and "there you are," with an abundance of willing help which is rendered unavailable for even partial service through fractional differences in the design of these various equipments.

Does not this incongruous condition of non-interchangeability in such important public utilities appeal to one as being almost criminal in effect, if not in intention, so far as conserving safety of life and property may be concerned? Why should the authorities of these large and important communities, or even those of the state in which they lie, continue to permit such assinine tempting of fate in case of other devastating fires.

The small fire loss per capita in European countries is largely due to governmental supervision, not solely in relation to the matter of building construction, but largely to the official control and organization of the fire departments, including the complete and enforced standardization of its fire appliances and its water supply, and in order to secure equal immunity from excessive fire loss in this country, we need just that modicum of "paternalism" which will insure an enforced standardization of fire appliances and of water supply in all of our communities; we need the restraint due to a rigorously enforced law of such character in order to save our property and lives from the ravages of fire due to our reckless carelessness as a nation.

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## RESPONSIBILITY FOR FIRES.

The Credit Men's Association and business organizations have endorsed the bill to enforce personal responsibility for preventable fires. The bill was prepared by the State insurance commissioners and the fire marshals, acting with the National Fire Protection Association.

# SAFETY IN MOTION-PICTURE THEATERS

## SUGGESTIONS FOR CONSTRUCTION, EQUIPMENT AND OPERATION OF KINETOSCOPIC SHOWS

[Abstract of a booklet published by The Travelers Insurance Company, Hartford, Conn., Copyright 1914.]

GENERAL CONSTRUCTION OF BUILDINGS.—The exterior walls should preferably be of masonry, or of structural steel and masonry, although concrete work with stucco ornamentation also provides a satisfactory fireproof construction. Concrete may be advantageously used for the floor, as it gives a clean, smooth, fireproof surface, which can be easily swept and kept in a sanitary condition.

Interior walls and partitions should be made of fireproof material throughout, and whenever doors or window sashes are required they should also be made of incombustible material. If windows are used in partitions they should be made of wireglass not less than ¼-inch thick. Mirrors are often placed along the walls of lobbies and corridors. Mirrors that may give the appearance of exits are especially objectionable, and there should be no false doors or windows.

Guard rails should be installed along the edge of the balcony directly over the auditorium. The tops of these rails should not be less than 3½ feet above the floor level at the front of the balcony. An excellent railing may be made of 2-inch metal pipe, substantially supported at intervals not exceeding 10-feet.

In modern theater construction cantilever trusses or plate girders for supporting the balcony have largely supplanted the view-obstructing columns in the auditorium, that were a feature of earlier designs. In ordinary practice the balcony should be designed and constructed to withstand a safe load of at least 200 pounds per square foot.

VENTILATION.—An adequate system of ventilation is essential, and this feature should receive careful attention. The air should be distributed uniformly throughout the house, without causing drafts.

Rule. To find the greatest permissible time for completely changing the air of the audience room, divide the volume of the room (as expressed in cubic feet) by the number of seats, and divide the resulting quotient by 40. This gives the maximum number of minutes that should be allowed for replacing the entire air of the audience room by fresh air from the outside.

Electric circulating fans, when fixed by brackets to the walls along the side aisles, should be placed not less than 7½ feet above the level of the floor, and should be protected by wire guards. Fans arranged to swing in a semi-circle are now quite commonly used.

ENTRANCES.—The floor inside of the main entrance should be on a level with the street sidewalk, whenever possible. This is sometimes impracticable, but every effort should be made to limit the difference in elevation to 6 feet.

When the number of persons accommodated in the balcony exceeds 200, at least two separate and distinct entrances should be provided for such balcony, and each of these should be not less than 5 feet wide. Entrance doors are sometimes constructed on a basis of 20 inches in width, in the clear, for each 100 seats in the auditorium, with a proportionate addition for any fractional part of 100 seats remaining.

EXITS.—The number of exits depends upon the seating capacity of the theater. In every case, however, there should be at least two exits leading from the main floor into open streets or avenues, through each of the side walls. Each exit should be at least 60 inches wide. The doors should swing outwardly, and should be fastened so that they may be quickly and readily opened from the inside at any time. We strongly advocate a self-opening arrangement, operated by merely pushing against a conveniently-located bar or plate.

All fire escapes should be substantially constructed, and provided with strong, firmly-secured hand-rails. When emergency exits and stairways are located inside the walls of the theater, they

should be separated from the auditorium by a fireproof partition not less than 4 inches thick.

A theater located between other buildings should have an external passageway on each side extending from the proscenium wall line to the street line at the front of the theater. If the theater abuts on a street at both the front and rear, these passageways should extend the entire length of the building. The passageways should be not less than 6 feet wide throughout their entire length, and their sides should be parallel. It is also advisable to cover them over at a height of 8 feet with brick or with some other fireproof material. Stores, offices and dwellings should be separated from the theater building by solid walls.

Sidewalks and passageways leading from exits to main thoroughfares should be smooth, unobstructed, and well illuminated.

STAIRS.—The risers of stairs leading from the main entrance to the main floor of the auditorium should be uniform in height. This height should not exceed 7¾ inches, and the treads should be at least 10½ inches wide. Wherever stairs lead downward from exits, there should be a space of at least 1 foot between the door opening and the edge of the top step. Stairways that extend to court or street grades should be entirely independent of one another.

All stairs should be provided with substantial handrails.

Non-slipping stair treads of abrasive material of some kind are often used, and these, or others of an equally effective type, are recommended.

TUNNELS.—If the total rise of the balcony, measured vertically, exceeds 12 feet, a tunnel or passageway should be provided for an exit.

SLOPE OF AUDITORIUM FLOOR.—The slope of the floor should be sufficient to permit persons at the rear of the room to clearly see the stage or screen over the heads of those sitting in front, but it should not be unnecessarily steep. A grade of 10 per cent. is sufficient.

SEATS AND AISLES.—In boxes accommodating no more than 15 persons it is usually unnecessary to have the seats fastened to the floor. In the auditorium, and in all other parts of the theater, however, the seats should be firmly fixed to the floor by suitable castings, each secured by at least three screws. Loose seats should receive immediate attention. The distance between the rows (as measured from the back of one seat to the back of another) should be at least 32 inches, and the width of each seat should be at least 18 inches.

When it is necessary to place hot-air registers in the aisles of the auditorium, these should be made flush with the floor, and all screw fastenings should be countersunk.

LIGHTING.—The indirect system of lighting is well adapted for moving-picture theaters, as it gives a soft, diffused glow which can be nicely regulated.

A red light should be located over each exit door, and this light should be kept burning continuously during the entire performance.

ELECTRICAL SUPPLY.—The electricity for lighting the theater and for operating the moving-picture equipment should be obtained, when possible, from two separate street mains. One service should be of sufficient capacity to supply current for the entire installation and its accessories, while the other supply should be sufficient for all emergency light.

When theaters have their own electrical generating plants, storage batteries should be provided, of sufficient capacity to operate the emergency lights in case of trouble with the generators.

The main service supply switches and fuses may be located in the operator's booth with advantage.

The fuses should be of the enclosed type throughout the entire building, all the wiring and electrical apparatus should be effectively insulated, and the entire electrical equipment should be maintained in good condition in every respect.

### FIREPROOF BOOTHS.

When moving-picture machines first came into use they were not enclosed, unless possibly by structures of canvas, cloth or wood. The necessity for enclosing the machines in fireproof booths

of some kind was universally recognized, however, after a number of disastrous fires had been caused by the ignition of the highly-inflammable films, and laws were then enacted requiring such enclosures.

TYPE.—The booths should be constructed so they will not only confine possible fires within them, but also keep persons in the audience in ignorance of any such fires, and thus diminish the chance of panic.

There are three different types of booths, respectively known as portable, semi-portable, and permanent.

LOCATION. — Careful consideration should be given to the location of the booth.

Whenever conditions will permit, it is advisable to locate the booth in some place above the balcony, and preferably at a point remote from any entrance or exit.

SIZE.—Where only one machine is used, a booth covering a floor space of 6 feet by 8 feet is large enough. In most installations of recent design duplicate machines are used. To accommodate this kind of equipment the booths should be at least 9 feet by 8 feet in their horizontal dimensions.

CONSTRUCTION.—A substantial frame may be made of 1¾-inch x 1¾-inch x ¼-inch angle iron. This may be covered over by sheet asbestos, at least ¼ inch thick, and so arranged that the joints will break over the angle irons—the joints being filled with plastic asbestos. The

# FIRES IN MOTION-PICTURE THEATERS

*A Partial List of Recent Fires, Compiled by Safety Engineering*

Jan. 16, 1914. Malden, Mass. Moving picture theater. Three stories, brick walls, wood floors, tar and gravel roof. Cause, cigar. Fire started third floor back of light shaft. Discovered, police. Alarm street box. Duration 1¼ hours. Fire stopped on third floor. Brick corridors retarded spread of fire. Value of building and contents, $98,900. Loss, $2,000.

Jan. 25, 1914. Grand Rapids, Minn. Gem Theater. Two stories, frame walls and floors, shingle roof. Cause, overheated pipe in basement. Discovered by smoke. Telephone alarm. Duration 1 hour. Fire stopped at roof. Wall lined with tar paper caused dense smoke. No private fire apparatus. Value of building and contents $3,000. Loss, $200.

Feb. 5, 1914. Waco, Tex. Moving Picture Auditorium. Two stories, brick walls, wood floors, composition roof. Supposed cause, incendiary. Fire started in rheostat. Alarm, street box. Duration 35 minutes. Value of building and contents $8,000. Loss, $2,800.

Feb. 8, 1914. Clay Center, Kans. Rex Moving Picture Theater. Two stories in front and 1 in rear, walls brick and frame, wooden floors, tar paper roof. Cause, filling oil stove of a cafe while the stove was lighted. Alarm, telephone. Duration, 4 hours. Absence of fire walls permitted flames to spread from cafe to grocery and moving picture show. Fire department was handicapped by roofs falling in after one partition was burned. No private fire apparatus. Value of buildings and contents, $45,000.

Feb. 9, 1914. Emaus, Pa. W. George's moving picture theater. Wood walls and floors, tin-covered wood roof. Cause, unknown. Fire started at building front. Alarm, fire whistle. Duration 2 hours. Tin covering about building retarded spread of flames. Fire department handicapped by water freezing as soon as applied. Value of building and contents $4,500. Loss, $3,000.

Feb. 17, 1914. Haverhill, Mass. Nickel Theater, two stories, wooden walls, floors and roof. Cause unknown. Fire started in waiting room. Discovered by mail carrier. Alarm, street box. Duration 3 hours. Fire stopped at next building. Two buildings involved. All-wood construction and front windows being boarded up favored spread of fire. Deep snow handicapped firemen. No private fire apparatus. Two men killed. Value of building and contents $25,515. Loss, $18,304.

Feb. 26, 1914. Hartford, Conn. Moving picture theater. Four stories, brick walls, wood floors, trussed slate roof. Cause, explosion of gasoline furnace in a trunk store, the flame jumping from a window in the rear up and into an open window back of the stage of the theater, thence into an open space under the roof which place was principally damaged. Discovered, by employes. Alarm, telegraph. Duration, 4 hours. Fire stopped at roof. Open attic and poor construction favored the spread of flames. Deep snow handicapped firemen. No private fire apparatus. Thirty people in building, 2 firemen injured. Means of escape, stairways. Value of building and contents $150,000. Loss, $52,548.

Feb. 27, 1914. Sackville, N. B. Bridge Street Moving Picture Theater. Three stories, wooden walls, wooden floors, boards, paper, tar and sand composition roof. Cause, unknown. Fire started in cellar near furnace room, spread-

door, which should be at least as large as 2 feet by 6 feet, may also be made of sheet asbestos, and it should have a spring attachment to keep it closed at all times. The flooring may be made of asbestos material, not less than ½ inch thick. The lens opening and the operator's lookout port must be provided with fire shutters made of hard sheet-asbestos not less than ⅛ inch thick, or of metal, and arranged so as to slide in grooves. These shutters should be held open by fusible links having a low melting point.

Ventilation may be provided by means of a fireproof vent pipe from 6 to 10 inches in diameter, attached to the top of the booth at the center, and extending up through the roof of the building and to some height beyond it.

A fire extinguisher should be located within the booth, and another one should be placed just outside of the booth door.

MOTOR-DRIVEN AND HAND-OPERATED MACHINES.—Opinions differ with regard to the relative merits of motor-driven and hand-driven machines. Each type has its advantages and disadvantages, but either will give good service if it receives proper care.

ANCHORING THE MACHINE.—If the machine is not set solidly, there will be vibrations from the motor which will cause flickering of the pictures on the screen. The table should therefore be rigidly secured by sockets set into the floor in a substantial manner.

AUTOMATIC FIRE SHUTTER.—The rays from the arc lamp produce a high tem-

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ing to coal room, storeroom containing tar, oil and paint. These exploded and spread the fire to the top of the building. Discovered through smoke breaking out through doors and windows at noon. Alarm, street box. Duration 5½ hours. Fire was stopped by adjoining brick wall. A good wall with five windows retarded the spread of the fire, the fire fighters covering the windows on the inside and playing water on the outside of sashes. The overhanging roof was made of wood and gave some trouble, as did cold and snow. Fire escapes provided exit.

March 24, 1914. Rochester, N. Y. Monroe Moving Picture Theater. Theater occupied first floor of 4-story brick building, upper floors being used as tenements. The fire occurred on the fourth floor. Cause, unknown. Loss, $1,000.

Apr. 5, 1914. Bowbells, N. D. Opera House. Two stories. Concrete walls, hardwood floors, rubberoid roof. Cause, bakery oven. Discovered by passerby seeing fire in roof. Alarm, fire bell. Duration 2 hours. Concrete walls stopped fire from spreading. Value of building and contents, $15,000. Loss, $7,000.

Apr. 18, 1914. Le Suer Center, Minn. Moving picture theater and two other buildings. Iron clad walls, wood floors shingle and tar roofs. Cause, unknown. Fire started under stairway. Discovered by owner of one building. Duration 4 hours. Iron cladding retarded spread of flames. No private fire apparatus. Value of building and contents $14,000. Loss, $3,000.

May 3, 1914. Anacortes, Wash. Moving picture and vaudeville show. Two stories frame walls plastered and lathed inside, rustic outside; double floors, tar and gravel roof, fly loft rubberoid. Cause, unknown. Fire started near fuse box on stage. Discovered by people upstairs. Alarm, telephone. Duration 2 hours. Fire stopped on stage. Smooth hard plaster retarded spread of fire. Shortage of men handicapped department. Value of building and contents $12,000. Loss, $1,000.

July 5, 1914. South Bend, Wash. Dime Theater. Two stories, wooden walls and floors, shingle roof. Cause, film igniting. Fire started in operating room. Duration 2 hours. Value of building and contents $3,000.

July 24, 1914. Jasonville, Ind. Family Theater. One-story, brick and wood walls, wood floors, shingle roof. Fire department was handicapped as there was no water. Chemical fire apparatus was on hand. This fire was a conflagration involving 45 buildings. One man was killed.

Oct. 16, 1914. Whitewright, Tex. Scenic Theater. One story, walls brick, floors wood and rubberoid roof. Cause unknown. Started in center of house. Discovered by passerby. Telephone alarm. Duration 1 hour. No private fire apparatus.

**These fifteen recent fires in motion picture theaters show fire outbreaks caused by cigars, heating apparatus, ignition of film, explosion of gasolene and electric wires. The fires did not always originate in the theaters, but when that was the case dangerous exposures existed. By these fires two persons were killed and two injured. Absence of private fire apparatus and unsafe construction are to be noted in many instances. In only one case was the fire cause peculiar to the motion picture business, namely, the ignition of a film.**

perature where they are focused at the projecting aperture. When the machine is in operation the film passes this point so rapidly that there is no time for it to become dangerously hot; but the heat is intense enough to ignite the film in a few seconds if the machine is stopped.

To safeguard against igniting the film in this way, a fire shutter should be installed that will automatically close the projecting aperture as soon as the machine comes to a stop.

FILM SHIELDS.—Additional protection against fire is insured when the upper and lower film magazines are entirely enclosed with metal coverings.

STORAGE MAGAZINES.—All storage magazines should be built of heavy-gauge galvanized iron, with inside partitions arranged so that no more than six reels of films can be stored in any one compartment.

ARC-LIGHT PROTECTION.—The housing for the arc lamp should be constructed of heavy sheet metal, lined with asbestos or mica to prevent short-circuiting in case the carbons come in contact with the sides of the housing. On each side of the enclosure there should be a hinged door with a ruby light in the center.

MISCELLANEOUS PRECAUTIONS. — The film should be conveyed through a covered channel.

A mat of rubber or linoleum should be placed on the floor around the machine.

All rheostats and switches that are located on the machines should be covered by sheet-metal or wire-mesh guards.

Double-throw switches should not be mounted so that the handle moves downward when *closing* the switch.

The circuit for the arc light should be open, and the doors closed, while the film is being removed from the magazine to be placed on the bench reel for rewinding.

The most convenient way for the manager and operator to work in harmony is to have a telephone connection between the operating booth and the manager's office.

The auditorium should never be entirely dark. A person entering a dimly-lighted room from a strongly-lighted street cannot see distinctly until the eyes have become accustomed to the new conditions. We also recommend that a placard be posted at the entrance, requesting patrons to stand at the rear of the auditorium for a few moments before going to their seats, so that their eyes may become accustomed to the faint light.

ELECTRICAL EQUIPMENT.—There has been considerable discussion regarding the relative merits of alternating and direct current for the arc light used to project the pictures. The direct current gives a soft light on the screen, while the light produced by the alternating current is somewhat harsher, and it is apt to flicker when it is generated at a frequency of less than 40 cycles per second.

MERCURY-ARC RECTIFIER.—This is a device for transforming alternating current into direct current, and as usually constructed it has a capacity of from 30 to 50 amperes. Some attendants operate the device above its rated capacity, believing that this will produce a more brilliant light at the arc; but this is bad practice, and it affects the rectifier injuriously.

WIRING THE BOOTH.—Part of the circuit is subjected to considerable heat, this occurring principally at the arc and in the resistances. These points should receive ample protection. All wiring should be conveyed in metal conduits wherever practicable. The incandescent lights over the machines and benches should be protected by wire guards.

Careless operators sometimes bridge the terminals of fuses with copper wires after the regular fuses have burned out. This should not be permitted. Cartridge or plug fuses should be used.

RESISTANCE COILS.—The resistance coils (which are used for regulating the current supplied to the arc lamp) should be encased, and should be mounted on some sort of fireproof material that is properly insulated. The wiring should be such that the temperature will not exceed 400 degrees F.

FILMS.—Standard-size films are 1⅜ inches wide and about .002 inch thick, and there are 16 pictures to each foot of film. Along each edge there are 64 perforations (known as sprocket holes) to each foot of the film, and the film, in its travel through the machine head, is impelled by sprocket wheels, the teeth of which engage in these holes. To obtain good re-

sults, the film should travel past the projecting aperture of the machine at the rate of about one foot per second. This means that there are 16 pictures projected upon the screen every second.

There are various kinds of films on the market at present, but they may be divided into two classes—inflammable and non-inflammable. The former are usually made of celluloid or of nitrocellulose, and the non-inflammable ones are ordinarily made of acetocellulose, which is a compound of cellulose and acetic acid.

Torn films are usually patched and otherwise repaired by the use of collodion, or by a solution made by dissolving a few small pieces of the film in acetic ether. These solutions are highly combustible, and should be kept in glass bottles or in metal receptacles of some kind, as they give off inflammable vapors even at ordinary temperatures. They should also be kept as cool as possible.

At present, inflammable and non-inflammable films are both in use in nearly all theaters. Owing to the fact that the two kinds of films can be used interchangeably in the same machines, all possible precautions should be taken to prevent fires, even when it is the intention to use non-inflammable films as much as possible.

OPERATORS.—An operator should have a knowledge of electricity sufficient not only to enable him to operate his machine intelligently, but also to make necessary repairs in case of an emergency. In many localities operators are required to pass examinations.

INSTRUCTION OF EMPLOYES.—All employes should be thoroughly instructed with regard to their duties before being permitted to begin work. They should also learn the locations and methods of manipulating the fire extinguishers and hose connections, and the nearest fire-alarm boxes; and they should become familiar with all of the emergency exits, fire escapes, and other protective devices throughout the building. Instruction should also be given them as to the best methods of dismissing audiences in case of fire or impending panic, so that the theater may be emptied quickly and in an orderly manner.

CO-OPERATION WITH INSPECTORS AND WITH THE FIRE DEPARTMENT.—In many cases a member of the local fire department is stationed in the theater during each performance, and the fire department is also ready to co-operate with the theater management in other ways. It is advisable, whenever possible, to have the theater inspected at regular intervals by persons trained in modern methods of fire prevention, because such inspections often disclose dangerous conditions, the existence or importance of which may not be apparent to persons who are not skilled in this work.

## HAZARDS IN OLD LOFT BUILDINGS.

Explaining the increase of fire insurance rates in many of the old loft buildings in Brooklyn, an underwriter said: "The buildings of this class have not been kept up, as they were in former years. On account of neighborhood changes, the owners were placed in a position where it was necessary for them to accept a new class of tenants for their buildings at greatly reduced rentals or leave their property vacant. Naturally, they chose the first course. As the buildings produced less income, it was impossible for the owners to keep the premises in first class condition without financial sacrifice, and that had something to do with the increase of insurance rates.

"The insurance companies have tried various ways and means to obtain additional premiums to offset the apparent increase of hazard. A large part of the increased income was obtained by adding a charge on all the buildings in which garment manufacturing was carried on, on account of the pressing tables and pressing boards. To remove that charge it is necessary to follow requirements to the extent of protecting such tables and boards with sheet iron.

"Another charge is added to the rates on account of smoking in the buildings. To remove the charge it is necessary to show that smoking has ceased. That is a difficult matter, and therefore in the majority of the older loft buildings a charge for smoking is taken off rarely. We have found it almost impossible to enforce prohibition of smoking."

## FIREPROOF ROOM FOR WASTE PAPER.

KANSAS CITY, MO.—Several fireproof rooms in the basements of large buildings in this city have been built for the storage of waste paper. They have the enthusiastic approval of the fire warden.

In November, 1914, the city council passed an ordinance to require that only small quantities of waste paper be kept on hand unless baled under heavy pressure, with wire binding. It ordered the use of waste paper receptacles, with self-closing doors, each receptacle to be equipped with a baling apparatus. At that time only a few balers to meet the specifications were available. Since then manufacturers have made devices. The ordinance provided, however, that paper could be kept in fireproof rooms, and several firms, that did not desire to buy balers, in many cases those whose janitors or engineers had the privilege of selling waste paper, preferred to take advantage of the fireproof room provision.

One of the simplest and most economical of the waste paper rooms is in the Savoy Hotel. There was an alcove about 8 x 10 feet off the engine room, with three walls of stone and concrete. Frank P. Ewins, president of the hotel company, approved the suggestion of his chief engineer that a waste paper room be built there. The engineer put in a front wall of concrete, bought a door and, to meet the "automatic door" provision, attached a simple device, as shown in the picture. The door was propped open so that the picture might be taken, and to show the manner of building the casing. The fire warden has referred many persons to this waste paper room as one that meets the conditions satisfactorily. The room will hold dozens of bags of waste paper, and it provides safety against fire.

Previous to the construction of the room waste paper had been collected in a concrete alley or area about 12 feet square, from which it was fed into the trash burner.

Fireproof rooms for waste paper in other buildings are being built of tile, or are attained by the lining of rooms with tile.

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COMMENTS BY SAFETY ENGINEERING.

From the photograph it is difficult to form a definite opinion as to the type of door used for the room. It appears to be a well covered, metal-clad door with good hardware. On account of the utter disregard of precautions for the handling of waste paper, it is apparent that any room, whether fireproof or not, must commend itself as an improvement. The common council of Kansas City having ordered a "fireproof" room for unbaled waste, the fire warden may, perhaps, be permitted to put his interpretation upon the word, but not so SAFETY ENGINEERING.

Judging by the photograph, the door, normally, is held shut by a heavy sash weight attached to a metal chain that runs over a metal pulley. When the vault, or room, ceases to be a novelty, we may expect to find the door "propped open," as the correspondent has mentioned, every day and all of the time as a matter of convenience and not merely for the purpose of photographing the frame of the door. To that extent, therefore, the room is not fireproof and the door is not of a commendable type. Better than none

it undoubtedly is; but whether it is materially better because of the self-closing device is a question.

The door is without a latch. Although the conditions that surround this particular case produce, perhaps, no internal pressure-hazard sufficient to move the door outwardly, if closed in the event of fire, the principle involved should not be approved by safety engineers.

## VALUE OF INTERIOR FIRE ALARM SYSTEM.

**[The particulars of an interesting incident are related in the following article, written by an observer.]**

A fire occurred in the premises at 11 Lispenard street, New York City, at about 8:42 a. m., September 24, 1914.

At the time the engineer of the building was on the elevator at the third story. He detected smoke in the elevator shaft and traced its source to a fire in the basement.

Immediately he set the interior fire alarm box in operation—which was located near the exit from the basement—and then went to the street box and sent the alarm to fire headquarters. The public alarm was received at 8:43 a. m.

The interior fire alarm system enabled the man to do within two or three minutes two things. By sounding the alarm on the interior fire alarm system he had the occupants out of the building within three minutes and by going immediately to the fire alarm box in the street he had the fire companies at the building within four minutes after the discovery of the fire. The firemen were able to go to work extinguishing the fire without delay through attention to occupants.

If this building had not been equipped with the interior fire alarm system the engineer would have been obliged to run up and through the building—six stories—shouting the alarm, and it is doubtful if he could have returned to the street to call the fire department before the occupants were out, which would have required at least ten minutes. Besides the tenants and their employes the engineer was the only person in the building. He had to act as engineer and elevator operator.

The building is of brick, non-fireproof construction, about 20 x 80 feet, with one stairway, an open elevator shaft from basement to roof and one outside fire escape.

By getting the alarm quickly, all of the occupants were able to go down the stairway and to the street before the smoke became dangerous. The number of employes was about 300, more than 250 being women. Light manufacturing, such as the making of dresses, waists, skirts, etc., was carried on chiefly.

The owner of the building was one of the first to comply with the new law to require fire alarm systems in factory buildings, and he deserves credit for having done so; also the tenants for having their employes drilled to respond promptly to alarm.

## LAWS RELATING TO LIGHTING.

At a recent meeting of the Council of the Illuminating Engineering Society, the Committee on Lighting Legislation presented a report on the laws of several States pertaining to lighting. The committee had collated the laws relating to lighting now on the statute books of the States of New York, Pennsylvania and Connecticut. The transcript of the laws of New York and Pennsylvania each covers the equivalent of 50 typewritten pages, in which references to lighting are with few exceptions very general in character. In many cases the regulations relating to lighting are included in sections of the law covering other topics, such as ventilation, etc. The laws relating to lighting in the State of Connecticut cover only one typewritten page containing only very general requirements. The committee has in preparation a digest of these transcripts. It has been decided not to proceed at this time with the plan to collate the lighting laws of other States, with the exception of the compilation for Illinois. The committee also considered the "General Orders" of the Industrial Commission of Wisconsin, which form the basis of the industrial lighting regulations of that State. These "general orders" are

subject to modification from time to time at the option of the commission. The feasibility of formulating a model lighting law for adoption by various States was considered and for various reasons this proposal was thought impracticable at the present time. However, as a step forward toward meeting the situation, it was decided to formulate a "Lighting Code" on school lighting and another on factory lighting. This work is under way.

## NATIONAL STANDARD HOSE COUPLINGS AND FITTINGS.

"National Standard Hose Couplings and Fittings for Public Fire Service" is the title of circular No. 50 of the Bureau of Standards of the Department of Commerce, of which S. W. Stratton is the director. The pamphlet contains a historical summary of the movement to establish the national standard, the resolutions at conventions of organizations, the committee report to the American Society of Mechanical Engineers on the national standard as adopted by fire protection organizations and a description of the present status of the national standard fire-hose coupling.

The real movement for the standardization of fire-hose couplings dates back to the fire in Boston in 1872. The subject was before the first convention of fire chiefs, in Baltimore, in 1873. The agitation received new impetus from the fire in Baltimore in 1904, when fire engines from Washington, Philadelphia and New York, on their arrival, could not make connection with the local fire hydrants.

The condition caused the Merchants and Miners' Transportation Company in April, 1904, to request the Secretary of the Department of Commerce and Labor to investigate the subject of fire-hose couplings. The matter was referred to the Bureau of Standards, that conferred with committees of the National Fire Protection Association and the American Water Works Association in New York City in 1905. The conference resolved that 7½ threads an inch should be recommended for 2½-inch fire-hose couplings. The thread was not regarded as necessarily an ideal standard, but was considered as a practical basis for unification under the conditions that prevailed.

At the convention of the International Association of Fire Engineers in Duluth, in 1905, the recommended standard was adopted, and at the convention in Dallas, in 1906, the association reaffirmed the action in Duluth and made its record complete by adopting the national standard specifications to cover couplings of 3- and 3½-inch inside diameter, each to have six threads to the inch, and a 4½-inch coupling, with four threads to the inch. Afterward many large organizations adopted the national standard.

Since the first publication of the specifications for the national standard in 1905 by the committee of the National Fire Protection Association there has been no serious criticism of the specifications; no modification or substitute has been adopted, nor has any organization refused approval.

The pamphlet contains a list of the cities and towns in which the national standard fire-hose coupling is in use. Therewith is a list of places in which facilities are provided for adaptation to interchange with the national standard.

F. M. Griswold, general inspector of the Home Insurance Company of New York and chairman of the Committee on Standard Hose Couplings of the National Fire Protection Association, furnished material for the circular. He has been recognized as the leading authority on the subject, to which he has given long-time work.

## FIRELESS COOKER.

In Hartford, Conn., a "homemade" wooden fireless cooker was found on fire. Evidently the cause was spontaneous ignition. The sides of the container sweating and dampening the sawdust, or the dropping of the disc which may have broken soldered joints and allowed grease and water to get through into the sawdust, would have contributed to that result.

# LESSONS FROM THE EDISON FIRE

THE behavior of the reinforced concrete in the fire of the Edison plant, West Orange, N. J., in December, has been the subject of critical discussion on the part of those interested in advancing the sales of other materials that are used in the structural frames of buildings. When a writer, in one of the periodicals devoted to the lumber interests, seizes the opportunity to say that the buildings, the "latest thing in fireproof construction, as conceived by Thomas A. Edison, himself," and "looked upon by architects as models of fireproof construction," "gave no better protection against fire than buildings constructed largely of timber," he shows that he takes a biased and unfair view of the matter.

Of the concrete buildings it can be said that, where the contents were, in the main, non-combustible, the damage done was slight; one might say they were uninjured. In those where the contents were combustible, but small in quantity, the concrete was somewhat calcined and cracked on the surface and, in some cases, spalled off at the corners. On the other hand, where the buildings were filled with highly combustible materials, such as cabinets, cases, cabinets in course of construction, records and wax for making records, the damage was much greater. In the buildings the interior columns were spalled off at the corners, exposing the reinforcement and in a few cases they failed altogether. Many exterior columns, or pilasters, failed by diagonal shearing. The spandrel beams over the window and door openings and the edges of the pilasters were spalled off where the flames licked around them.

The floor beams were not damaged badly. Cases of spalling off at the corners and exposing the reinforcement were apparent, but on the whole the damage was slight. Where the floors had settled, due to the failure of the columns, the separating of the slab from the beams indicated that the workmen had followed the practice of pouring the columns and beams before the slab, thus allowing an initial set to take place in, or laitance to gather on top of, the material already in place in the beams, either of which will prevent the positive bonding of the slab with the beam. At some places there was every evidence of a perfect bond.

It is the opinion of the writer that, had the interior columns been properly hooped, or banded, the damage to them would not have been so great. Also hooping would have kept the vertical rods in their correct position in the columns when the concrete was poured. This applies as well to the exterior columns or pilasters. These latter, however, were subjected to unforeseen bending strains, due to the expansion of the heated concrete, for which they were not designed, and which caused them to fail by shearing.

The vital question for consideration is not whether or not one material is to be used for building purposes to the exclusion of all other materials, but instead what can be done by all, pulling together, to get relief from a terrible tax, placed upon us by fire. Slow burning, mill construction, than which there is no better for certain purposes, has its limitations. These should be recognized and no effort made to extend use beyond them. Exposed steel frame, with steel roof truss construction, with or without brick walls, has its place in the scheme of things, and it should be used in the place where it is best suited. Reinforced concrete has qualities that make it second to none for certain types of buildings, and without steel, fireproofed with burnt clay products, our magnificent, multi-storied buildings would not have been possible.

This fire will serve its purpose, and may be considered not a total loss, if it causes us to recognize and appreciate the fact that the inflammable nature of the contents of buildings and proximity to other buildings of a hazardous nature form a risk, the proper safeguarding of which is the first requisite of good engineering.

An ample supply of water at good pressure, and not on the dead end of the system, ample water storage capacity, hydrants well placed and in houses equipped completely, automatic sprin-

klers throughout the plant, an adequate fire pump operated by reliable sources of power and an underground piping system valved properly should be provided as the yard equipment. Fire walls, with fire doors hung properly, large areas cut into small ones, hazardous operations isolated, plenty of chemical fire extinguishers and metal window frames, with sash fitted with wire glass, on the exposed sides of the buildings at least, should be parts of the building construction. These fire prevention features must be used to insure reasonable protection from fires, regardless of the material employed in the construction of the buildings.

As one writer said truly, there is "no question of such prime importance on which the public is so helplessly befogged as this very one of fire prevention." This being the case, let us get together to clarify the situation and, by a campaign of education and publicity, create a demand for the right thing in fire prevention.

# FIRE-SAFETY IN INDUSTRIES

GASOLINE STORAGE. — Experience has proven that the underground system renders the storage of gasoline practically safe, the danger being in the handling largely, an authority says. Underground tanks should be placed not less than 2 feet below the surface of the ground, and if within 10 feet of a cellar or other open area which is below any part of the buried tank, they should be embedded in cement concrete, not less than 10 inches in thickness. Such tanks should be constructed of steel plates from 3/16 to ¼-inch in thickness, and should be well covered with asphaltum varnish to resist rust. Usually there are three pipes leading from the top of the tank—the filler pipe, the draught pipe and the vent pipe. The latter extends from the top of the tank to a point 4 feet above the roof of the building, and is considered necessary to conduct off the residual vapor in the tank, which is forced out during the process of filling.

DUST COLLECTION. — This at once brings to mind exhaust systems, says C. T. Rogers Graham, M. D. The necessity of dust collection or of providing exhaust systems for woodworking machinery has a three-fold object. First, the accumulation of dust and shavings en masse constitutes a grave fire hazard. The finer particles rise, settle on rafters, window ledges and trusses and in obscure places where its removal becomes remote and unthought of. Piles of wood dust near machines, commonly called sawdust, are a common sight within many woodworking shops, where a match, carelessly thrown away after lighting gas jets and often times a pipe, may kindle a fire which may not burst forth for hours after the work room has been closed.

RAILROAD FIRES.—Efficiency in the methods and apparatus used in fighting fires on the Pennsylvania Railroad System is shown by the annual report of the railroad system's insurance department, which has just been compiled. Four hundred and twenty-seven fires, more than three-quarters of all that occurred on the property of the system last year, were extinguished by company employes before receiving the aid of public fire departments. Promptness in checking the fires kept the average loss on each down to $43, although the property directly endangered was worth $9,516,434. The actual damage sustained in fires extinguished by employes was only $18,468, or less than one-fifth of 1 per cent of the value of the property threatened. Organized fire brigades among the employes last year checked 34 fires and saved $1,524,075 worth of property, at a loss of $706. Other employes, by the use of chemical extinguishers, put out 71 fires, saving property to the value of $3,713,228, with a loss of only $2,684; and by the use of the company's fire hose protected property having a value of $1,779,022, through extinguishing 43 fires with a loss of $2,262. The total fire loss on the Pennsylvania sys-

tem during the year 1914, including fires where the assistance of city fire departments was received, was $658,-483, while the value of the entire property was nearly $400,000,000, the fire loss being only 16 cents per each $100 of property value at risk.

A STEEL COMPANY'S FIRE RULES.—Fire reports are required from superintendents of departments for every fire that originates in the plant of the Youngstown Sheet & Tube Company, from whatever source, no matter how trivial the damage may be. A card record is kept of all these fires, also of all fire extinguishers, hose houses and fire hydrants. The record of the extinguisher shows the make, when purchased, when tested and inspected. Soda and acid extinguishers are required to be refilled and inspected at least once in six months. Pyrene extinguishers are refilled as soon as used. All hose-houses are visited on the first trip of each patrolman on whose beat they are located, both day and night, the fire fighting equipment is inspected, and a report of its condition is made by each patrolman. Hose-houses are provided with incandescent electric lamps that light automatically when the doors are opened. Patrolmen are instructed to watch for unsafe and dangerous places and for workmen who are careless or indifferent, and to assist in the care of injured workmen and at fires.

POURING GASOLINE AT GARAGES.—During the early part of last April a fire occurred at the Cambridge garage of the Metropolitan Park Commission while they were filling a car with gasoline by pouring it into a funnel through a chamois skin strainer from a five-gallon can. To make the funnel set upright on the car tank they had placed a piece of wood with a hole in it over the filler hole of the tank, thereby insulating the funnel from the metal of the tank. After a few quarts of gasoline had passed through the chamois skin, the man happened to bring the pouring can near to the metal edge of the funnel, when a spark jumped from one to the other and set fire to the gasoline vapor rising therefrom. Quick action with extinguishers saved the car. The man insisted that he saw and heard the spark, and believed he could cause it again in my presence, said State Chemist Walter L. Dedger, of Massachusetts. So, armed with a gold leaf electroscope used to show the presence of static electricity in any substance, he proceeded to make a number of tests. The officials of the Standard Oil Company, both in Boston and New York, as well as several engineers and technical men, were very much inclined to disbelieve what they termed a theory, so he invited them to be present. They imitated the conditions at the time of the fire, except that they took the car on the open floor of the garage. They caused the spark by simply pouring gasoline through a chamois skin covered funnel insulated from the floor, and all present saw it.

A chauffeur in a private garage at Brookline hung a five-gallon can by the bail, on the hook of a common self-measuring pump, the bail having a wooden handle, which insulated it from the metal of the pump. He had drawn about a gallon when a spark jumped from the can to the pump and set fire to the gasoline. He threw the can out of the open door and, after extinguishing the fire and desiring to fill his car, he repeated the operation with the same can with the wooden handle, and it caught fire the second time.

After that the man refused to go near the pump and went to a public garage to get his car filled.

OIL FIRES.—A new method for extinguishing oil fires was patented on December 1, 1914, by Robert Scheuffgen, of Salzkotten, Germany. His method consists in sinking to the bottom of the oil tank or receptacle on fire, two separate solid chemicals containing foam-forming substances. The substance is to be put in the tank previous to the possible fire, and to be kept in place until in time of need, when water is sprayed into the tank, which sinks to the bottom, dissolves the

chemicals, permitting them to give off non-combustible and non-combustion-supporting gas, and form foam, which floats to the surface of the liquid, spreads itself thereover, and smothers the fire. *Oildom* says the theory is reasonable, but how it will work out in actual practice remains to be demonstrated.

FIGHTING OIL FIRES WITH FOAM.—The Standard Oil Company of California is installing a foam-making plant for extinguishing fires at Waite, Cal., at an approximate cost of $30,000, or 1 cent per barrel of oil, which the company announces is the first and practically only cost, and the upkeep is nominal. At sales stations where such fire protection apparatus has not already been installed, work to that end is under way.

PAPER COMPANY'S FIRE RULES.—If valves are closed or an extinguisher is emptied, report it promptly, are the instructions in an Oregon paper company's plant. "Don't pile materials around fire hydrants; in case of fire you may lose the first few seconds or minutes which are so precious when a fire is to be combatted successfully at its start," are further instructions.

INFLAMMABLE LIQUIDS.—Rules and regulations for storage and handling have been issued by the state fire marshal of New York for 1915.

## STORAGE OF MOTION PICTURE FILMS.

Commissioner Adamson of the New York Fire Department directed the Bureau of Fire Prevention to send the following communication to film exchanges:

> The rules of this department for the storage of motion picture films require that all films when not actually in use or under examination or repair shall be kept in a metal box, provided with a tight fitting cover.
>
> It has come to my attention that this very important regulation is flagrantly violated in a considerable number of establishments where inflammable motion picture films are handled, and it is my intention to cause the closing up of every establishment in which this rule is not followed.
>
> I take this occasion, therefore, to notify you of my intentions, in order that you may immediately provide yourself with a sufficient stock of metal cans to comply with this regulation; and further that there may be no ground for complaint of undue severity in case our inspection shows that it is advisable for me to pursue the course above stated.

## FIRE DANGERS IN COLLEGES.

The general superintendent of one of the leading colleges, writing to SAFETY ENGINEERING a few days ago, said:

"Since the article appeared in the May, 1907, issue of your magazine in regard to the fire risks at colleges, we have purchased a great many chemical extinguishers; a number of the Pyrene extinguishers; have placed three hydrants outside of buildings; have made several changes in our fire mains, adding greatly to the efficiency of the service, and have purchased a considerable quantity of unlined linen hose for the interior of the buildings. We are doing away with the liquid alcohol stoves and are urging the use of the solidified alcohol and have taken out all gas lighting fixtures. All of our buildings are now lighted by electricity."

The special investigation of fire dangers in colleges undertaken by this magazine eight years ago produced stupendous results in the way of better construction (as new buildings were erected) and immediate improved equipment for fighting fires. It is to be doubted, however, whether the colleges have done as much as they should do toward providing safe dormitories for the students.

The frequency of fires in college buildings indicates that the educational authorities, who have charge of institutions of learning are in sad need of education, even of an elementary sort, on the subject of fire prevention.

# EDITORIAL

**Inconsistency in the Use of Colors.**

SAFETY ENGINEERING has called attention repeatedly to the inconsistency in the use of colors for indicating safety or danger. Public officials are the most flagrant violators of the principle that governs the correct use of colors. Our attention has been called to the Park Commission of the City of New York, that exhibits boldly a red ball when it desires to advise the general public that the ice on the ponds in the various parks is safe for skating. The principle, accepted universally, that red at all times indicates danger, would naturally and properly convey to the minds of those who saw the red ball displayed the idea that they were to keep away from the parks, and undoubtedly a great number of people so interpreted it. Is there any real reason why the Park Commission and other public officials cannot adopt the same logical use of color as have private institutions, to let red at all times indicate danger and green indicate safety?

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**Labels for Safety.**

AS PREVIOUSLY commented upon in these pages, the Underwriters' Laboratories, Inc., in conjunction with the Workmen's Compensation Service Bureau, has established a label service, applicable as respects safety to the life of machinery and appliances, on lines similar to those of an inspection and label service system to appliances from a fire prevention standpoint. It is to be hoped that all of the American manufacturers will immediately realize the value of this service. Undoubtedly the progressive manufacturers will lose no time in availing themselves of it. The purchasers of machinery throughout the States are becoming educated rapidly to the fact that the proper time to safeguard any machine or appliance is when it is being manufactured. At that time it can be done most effectively and at the same time most economically. Naturally, therefore, in purchasing machinery in the future, they are going to look for the label as the sign to indicate whether or not all precautions possible have been taken in the matter of safeguarding in original design. The manufacturer who is alive to this subject is sure to reap the benefits. He will be in sympathy with a rapidly crystallizing public opinion as respects safety to operators of machinery, and manufacturers' responsibilities in relation thereto.

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**Captain Dow and "Safety First."**

CAPTAIN DOW of the *Lusitania* may have violated all or none of the international laws and ethics when, apprised of the presence of German submarines in the Irish Sea, he ran up the stars and stripes as a protection against them. Whether or not any laws or rules were broken, matters little. The fact remains that he carried numerous American citizens; he carried American mail, and as captain of the ship to which they, the passengers, and to which the government of the United States had entrusted the safety of the mail, he displayed an admirable degree of common sense, and a keen appreciation of "Safety

First." The stars and stripes might be put to worse use than a recognized and respected insignia of safety to all people. This, in fact, it has been for decades to the countless millions who, having renounced the land of their birth, with its oppressive military rule, have embarked and landed on the shores where, under the protection of "Old Glory," they have found fertile fields for their endeavor and freedom in thought and action.

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**The Telephone and Safety.**

THE RECENT conversation between the mayor of San Francisco and the mayor of New York over long-distance telephone draws our attention forcibly to the tremendous development of this device during its forty years of existence. From the standpoint of safety, it presents interesting phases also. Whereas it has never been recognized, and there are practical reasons why it never will be recognized, as an effective fire alarm medium, still it is used extensively as an auxiliary in remote sections of cities for notifying the fire department of fires. It equally offers splendid protection in our residential districts for notifying the police departments in case of burglary attempts, and to the farmer and other isolated inhabitants of all communities, it presents a medium whereby he can immediately put himself in communication with physician or surgeon in case of sickness or accidents. This last service is used extensively around large industrial plants, also where, when an accident occurs, the physician is summoned usually at once by telephone to the scene. What we would do without this telephone now is impossible to conceive, and one often wonders how the world got along without it. Dr. Alexander Graham Bell, the inventor, is one of the few really great inventors who has lived to observe the benefits to humanity and civilization which his early labor and efforts have produced, and SAFETY ENGINEERING takes this opportunity to extend its most hearty felicitations to him on the event of his new achievement in long-distance transmission of the human voice.

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## NATIONAL SAFETY MOVEMENT.

The safety movement is here to stay; triumph it will eventually.—*R. W. Campbell.*

During the last five years the manufacturing concerns which have been pioneers in the safety movement have demonstrated that it is possible to eliminate 75 per cent of the deaths and serious accidents and to reduce the number of days lost on account of injury at least one-half.—*C. M. Price.*

Bring the safety movement home to school children; they will carry its reflex effect back to their homes.—*Geo. K. Gibson.*

Keep your men normal; remember when you censure a man in the presence of his fellows, you jolt him out of normal.—*J. G. Noack.*

The use of bulletin boards has been found to be one of the simplest means for keeping the idea of safety before the men.—*C. M. Price*

So generally does accident prevention pay well from a dollars and cents standpoint that the average business can undertake few phases of industrial development which will pay it equal returns.—*H. W. Forster.*

"Safety First" is an investment that you can and will eventually consider in terms of money.—*Melville W. Mix.*

Provide good ventilation for your employes. The cost is insignificant in comparison to the financial loss directly traceable to the lack of pure air in your office, factory or workshop.—*Ira J. Owen.*

All men should be compelled by law, in their own interest, and the interest of fire prevention and protection, to build with fireproof material. If one-half the money spent for fire losses were expended for better building construction, the annual loss by fire would soon begin to decrease.—*J. William Morgan.*

# Safety in the Plant of the Commonwealth Steel Company

*By Edward T. Walsh, M. E.*

FELLOWSHIP.—*I issue from the heart of things to go to those who really love sinserity and Truth.*

*Reverencing a Supreme Power; doing unto others as we would have them do unto us; recognizing business as truthful service; a fair opportunity to all; safe and proper working conditions; honest work; just compensation; right thinking; true living; pure friendships and all the glorious fun in the world—are the things I most love and for which I stand.*

*I am edited by Good Fellowship and published by all those who pass along my gospel of kindness.*

*My price is beyond the reach of any but the very rich—those who are rich in kindness, honesty and good cheer.*

*If you pay this price you can have me without money cost.*

*From the first number of "The Commonwealther," the monthly periodical of the Commonwealth Steel Company.*

THE principles embodied in the second paragraph of the above announcement, when followed out to a conclusion, will bring to an end all differences among men, regardless of station in life and diversity of interests. That the Commonwealth Steel Company, of Granite City, Ill., is aiming toward that ideal, is evidenced by the work accomplished in its efforts to make the conditions, under which its employes perform their part of the industrial contract, safe, sanitary and equitable.

Just eight years ago the Commonwealth Fellowship Club was started in a small building, with a membership of fifteen. It has grown to a membership of more than 550, and it occupies a fine brick clubhouse, shown in Fig. 1, in which are the workmen's locker room, school and library. All of which aim to bring out the Brotherhood of Man. That "having the men with you" is the first requisite of good safety work, is one of the beliefs of the company, and unless this fact is recognized and followed out, no campaign for safety will be successful.

In May, 1912, the Commonwealth Steel Company started its safety campaign, and Arthur T. Morey was placed in charge as manager of the newly organized Safety and Fellowship Department. The problem of mechanically safeguarding all hazardous machinery was undertaken under the direction of a competent safety engineer, who was placed in charge of plant and safety work. The work has been continued to the present time, with the result that practically all of the known hazards have been efficiently guarded against. Safety walks have been provided in places where workmen's duties require them to place themselves in dangerous positions.

Recognizing that it was necessary to have the co-operation of the men in the work to be done, their assistance, in the form of suggestions, was solicited. As a convenience several suggestion boxes (each a small mail box, see Fig. 2) were installed in conspicuous places, with signs reading as follows:

> Safety suggestions and any other ideas that will promote the welfare of workmen and the efficiency of the shop are invited from all. Due credit will be given for all suggestions approved. Write it down and drop it in the box.

During the first year more than 500 suggestions were received, and each

Courtesy of Commonwealth Steel Company.

**Fig. 1. House of the Commonwealth Fellowship Club.**

suggestion was answered by a courteous letter, acknowledging receipt, with a safety pencil enclosed. Later, after the suggestion had been disposed of, another letter was sent, advising of its disposition. If the suggestion was adopted, a "Safety and Efficiency" fob was presented to the suggester.

Early in 1914 a special effort was made to educate the men along safety lines. Safety committees were formed; a plant central safety committee of superintendents was appointed to handle the reports and recommendations of the shop committees. The shop committees are usually composed of five men, three of whom are workmen.

Another educational feature has been the installation of twelve large safety bulletin boards in conspicuous places. The boards are kept alive with good safety literature, pictures of bad practices and the way to correct them, and other interesting data in the line of safety education. In the finishing department, where the greater number of the men are foreigners, an interpreter is employed to be constantly with the workers, with a view of eliminating unsafe practices and teaching correct methods.

The following extracts from President Howard's instructions in the "Safety Rules" book contain business sense, and they may be used by any business that contemplates the making of a similar book, provided the business qualifies to the first part of the first sentence:

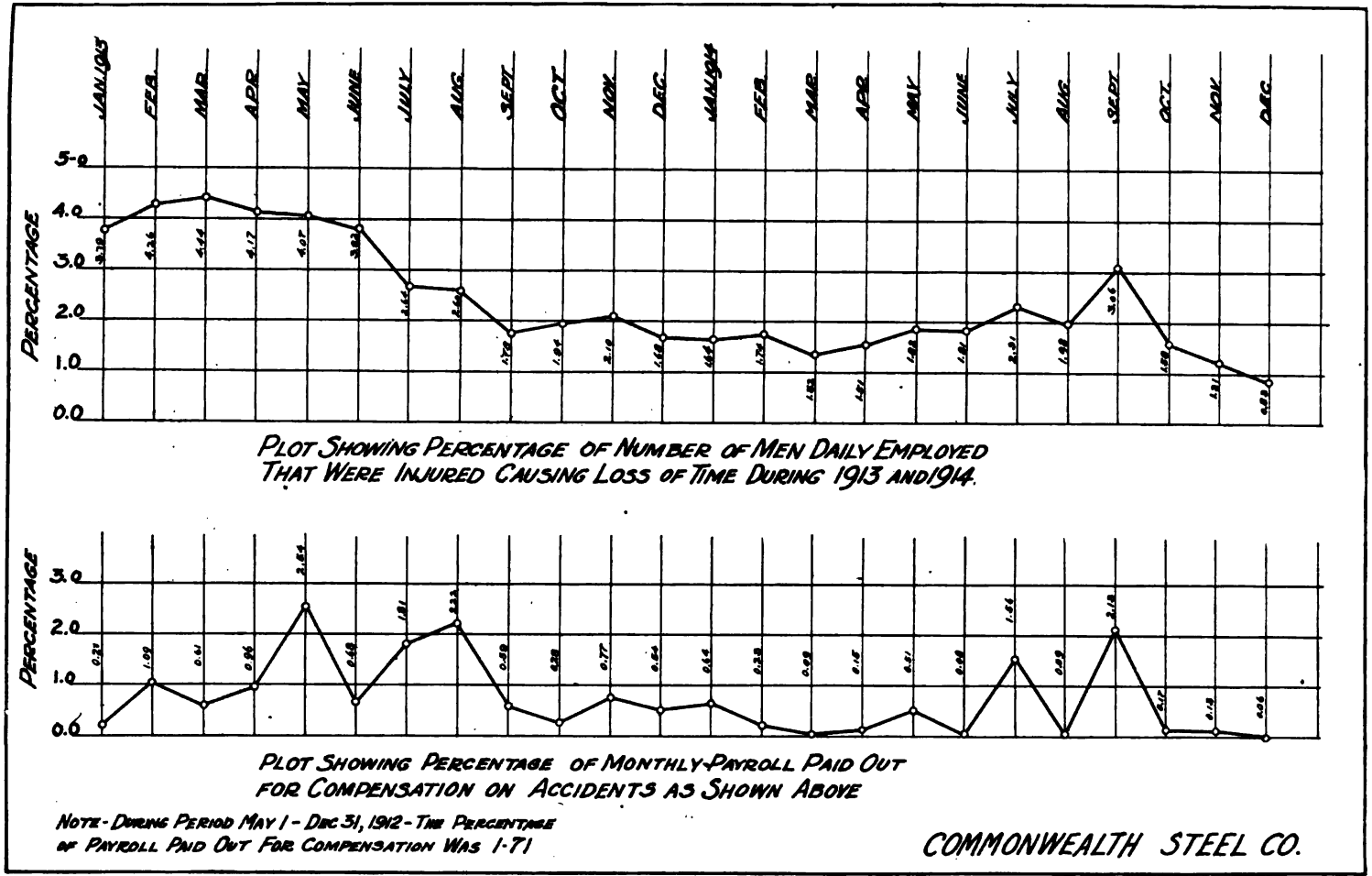
"As our business is a proper one in its object to give right service and to protect life and property with its devices, it cannot be necessary that we injure men in producing those devices. Let us then, and without timidity, set a mark for ourselves that we eliminate all accidents and set our faces resolutely to that end."

"'Safety First' shall be our policy, for if this were not so, we would value money above the lives, limbs and health of our workmen, for every haste and so-called economy that the policy of Safety First would seem to interfere with, is measurable in dollars and cents. We older men must set the example to our Commonwealth Fellowship Club boys and other young men that money, to be enjoyed, must be well earned and clean of all selfish cost. We should find, however, that safety work being a study of the right and orderly way to do things, will increase efficiency and aid economy."

"This is not only an appeal to the

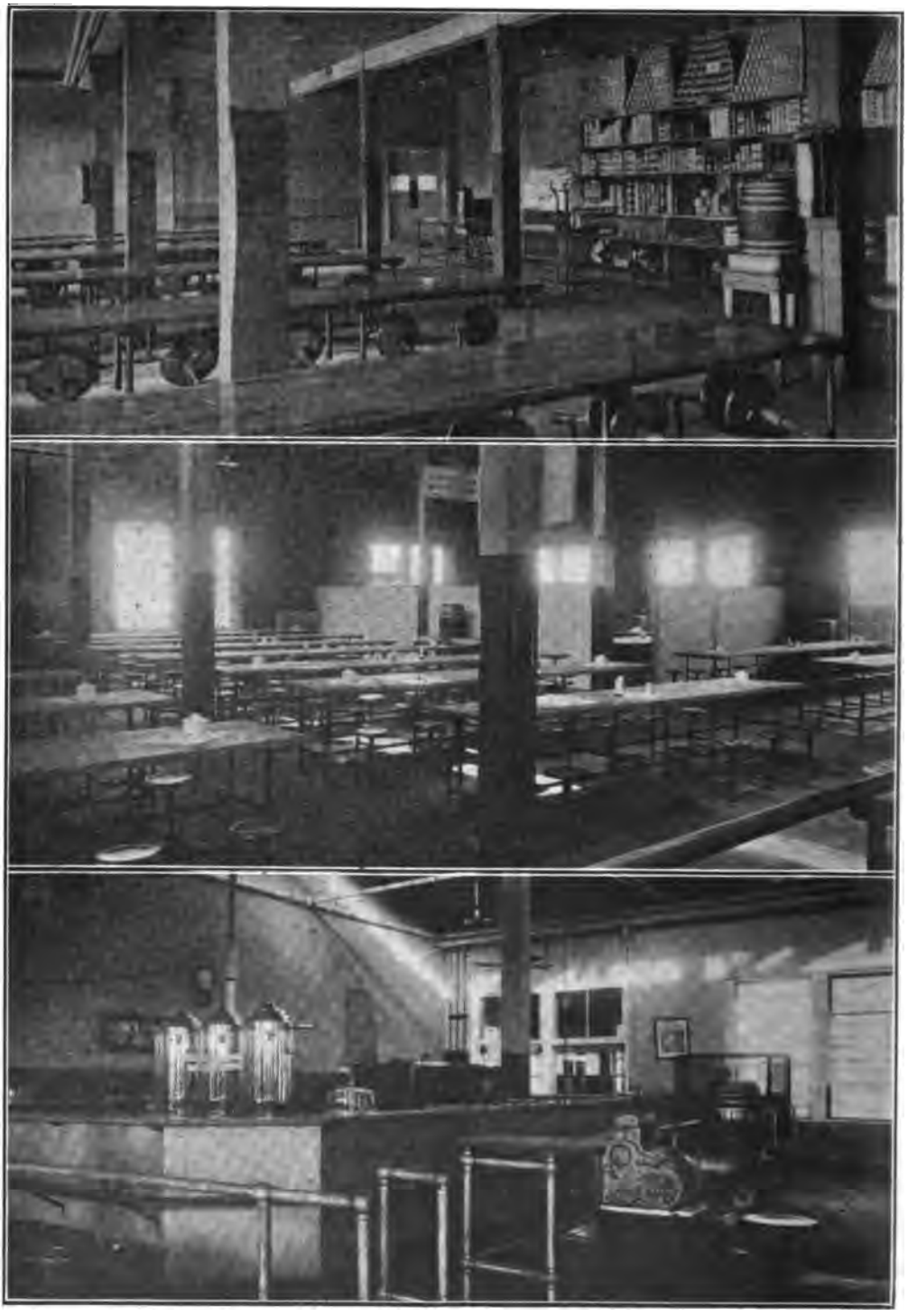
Courtesy of Commonwealth Steel Company.

**Fig. 2. Suggestion Box in Use.**




Courtesy of Commonwealth Steel Company.

**Fig. 3. Accident and Compensation Chart.**



Courtesy of Commonwealth Steel Company.

**Fig. 4. (Top) Commissary and Lunchroom. (Center) Cafateria, Workmen's Restaurant. (Bottom) Corner of Workmen's Lunchroom.**

Courtesy of Commonwealth Steel Company.

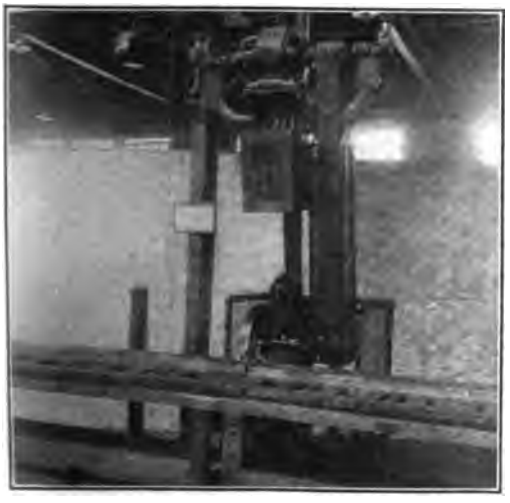
**Fig. 5. Dispensary.**

employes of the company to observe every care for the safety of themselves and of others. It is also a direct order from the company to every superintendent, foreman or other person having authority over its employes, to see that those under them take proper care for their own safety and for the safety of others in doing their work."

"More important than safe machines and safe places are habits of care and watchfulness."

"Remember that while every man is hired to do some particular work, the safety of himself and his fellow workmen is more important than that work."

"Remember that if a workman has a preventable accident, to that extent he is unsuccessful in his job, and to that extent his foreman is unsuccessful in his foremanship.



Courtesy of Commonwealth Steel Company.

**Fig. 6. Guarding of Swing Saw.**

Courtesy of Commonwealth Steel Company.

**Fig. 7. Howe Jointer Guard. (In position.)**

"When carefulness and efficiency become fixed habits, accidents will not trouble us."

That the policy of the company is being conducted along right lines, is shown by the results of the two and one-half years' campaign, which are gratifying, in the low number of accidents and consequent small amount paid for accident compensation. These features are shown graphically by the chart, Fig. 3, and in the following table:

| Period. | Average Daily Number Men Employed. | Total Number Lost Time Accidents. | Per Cent of Daily Employed Injured Causing Loss of Time. | Per Cent Payroll Paid in Compensation. |
|---|---|---|---|---|
| July to December, 1912, inclusive... | | | | 2.08 |
| January to June, 1913, inclusive.... | 2,176 | 499 | 22.9 | 1.03 |
| July to December, 1913, inclusive... | 2,515 | 311 | 12.4 | 0.98 |
| January to June, 1914, inclusive.... | 2,479 | 241 | 9.7 | 0.29 |
| July to December, 1914, inclusive... | 1,435 | 172 | 11.9 | 0.85 |

The chart, Fig. 3, indicates the decrease of accidents as the men became familiar with the new order of things and the safeguards that were added to the machines.

Fig. 1 indicates the high character of the Commonwealth Fellowship Club's house and what the company is doing to make the plant attractive and orderly. It is considered a great safety help, as good order is undoubtedly the basis of good safety work.

Fig. 4 has three views of the cafeteria lunch room and commissary department. This latter is run for the benefit of the employes, to give them a chance to buy home supplies at right prices. All of which tends to better and kindlier relations and helps out in the efforts made for safety work.

The plant dispensary, shown in Fig. 5, is equipped throughout with the latest appliances for best medical attention. Adjoining is the rest room and physical examination room, equipped with dressing booths.

The suggestion box, mentioned in the foregoing, is shown in Fig 2. It is simply a mail box on a board, with a sign above that explains the use of the box. It furnishes a means of communication from the men to the management, thus giving a feeling of interest and co-operation to even the most humble employe.

The thoroughness with which the problem of safeguarding the machines was handled is shown by the accompanying figures. Fig. 6 shows how a swing saw is guarded. Note that the transmission is fenced in so that a person cannot approach too close to it. Note the automatic lip guard to prevent contact of the saw with the operative's body. Note the chain to the counterweight to prevent it from falling in case the arm breaks, and note how well the belt is guarded. Also see the safety switch box, quick-pull-out type, handy for the operative. A particularly fine thing is the rubber matting on the floor to prevent slipping. This matting, wherever used, is let into the floor so that it makes a flush surface.

The placing of the Howe jointer guard on a machine is shown in Figs. 7 and 8, Fig. 7 showing the guard in position and Fig. 8 with it thrown back out of the way. The guard is counterweighted so as to be adjustable automatically to any thickness of lumber from 1/16 of an inch to two inches. It can be adjusted quickly to take stock up to eight inches thick by lifting handle. The operative is protected because he is compelled to change hands when feeding stock over the blade, as the fingers act as ticklers and warn him against, and prevent him from passing a hand directly over the ar-

Courtesy of Commonwealth Steel Company.

**Fig. 8. Howe Jointer Guard. (In removed position.)**

bor. Fig. 8 shows how quickly the guard may be removed when occasion requires, by turning over to back of the jointer. By sliding the hood, or main member, transversely the edge of stock of any width may be jointed along the fence. Fig. 8 shows also how the driving belt is safeguarded. Each illustration shows a mat on the floor to prevent slipping.

Fig. 9 shows a Howe saw guard mounted on movable stand. It is applicable to any type of table, whether tilting or stationary. This rig is independent of saw vibrations.

The danger, from the heavy bail of a sand bucket falling and possibly injuring a man working around it, has been eliminated in a simple and ingenious manner, as shown in Figs. 10 and 11. By referring to Fig. 10, it will be seen that the lug, which is riveted on the bail, drops by gravity into the recess formed by the two lugs on the rim of the bucket, thus holding the bail in an upright position. Play at the trunnions allows the lug on the bail to clear the

Courtesy of Commonwealth Steel Company.

**Fig. 9. Howe Circular Saw Guard.**

Courtesy of Commonwealth Steel Company.

**Fig. 10. Sand Bucket Bail Catch. (Bail fixed in lugs.)**

**Fig. 11. Sand Bucket Bail Catch. (Bail lifted to clear lugs.)**

Courtesy of Commonwealth Steel Company.

**Fig. 12. Grab Bucket, with Handles for Opening.**

lugs on the rim when the bucket is raised by the crane, and it can thus be dumped readily. Fig. 11 shows the bucket being lifted by the crane and the lugs clearing each other The lugs are indicated by arrows.

One man lost a hand and another lost two toes by trying to force open a grab bucket, as shown in Fig. 12, before the handles, marked by the arrows, were riveted to the shells, eliminating the hazard. The handles are substantial, and are not destroyed by rough handling of the bucket.

Wooden yokes for handling moulding flasks have been discarded, and carefully designed steel beams are used instead. Fig. 13 shows one of the new type, with its special notches for holding the slings in their proper positions; also the handles, which are part of the slings, for the men to use when turning the flasks over, thus avoiding catching fingers between the slings and flasks. Before the handles were used, several men had their hands caught.

Courtesy of Commonwealth Steel Company.

**Fig. 13. Flask Yoke, with Slings.**

As there is usually danger to the crane operator, getting up to and down from the crane cage, the landing platform, shown in Fig. 14, was designed and erected. It consists of a permanent steel ladder and platform, at which the crane is stopped when the operator wishes to leave the cage.

Courtesy of Commonwealth Steel Company.

**Fig. 14. Crane Landing Platform.**

The trimming of the lamps among the roof trusses had to be done from the crane trolleys and at such times as the cranes were available. The method was hazardous, and therefore the walkway, shown in Fig. 15, was erected and the lamps were placed alongside of it. They receive regular attention from the attendant who works in perfect safety. The monitor ventilating sash are operated also from the walkway.

Each crane has been equipped with plank walkways, supported on structural steel brackets on both sides of

Courtesy of Commonwealth Steel Company.

**Fig. 15. Lamp Trimmer's Walkway.**

**Fig. 16. Safety Walks on Crane Bridge.**

the crane bridge girders. The walks are protected by pipe railings, and they give safe access to any part of the crane for oiling, repairs, etc. Fig. 16 shows the walks, also the lamp trimmers walk and the access, or landing, platform mentioned.

Charging the open hearth furnaces is more or less hazardous from the sparks that fly out. This danger is aggravated when there is water or snow in the charging boxes. To protect the operator the glass shield, shown in Fig. 17, was devised. It consists of a panel of glass which may be slid, from one side of the holding frame to the other, to the position desired.

Exposed electrical switches form a source of danger from shock caused by coming directly in contact with it, and also from the possibility of having it inadvertently closed when men are working on the line controlled by it. A box, equipped with hasp and staple, such as shown in Fig. 18, was placed to enclose each switch. The hasp is

Courtesy of Commonwealth Steel Company.

**Fig. 17. Spark shield for charging machine.**

Courtesy of Commonwealth Steel Company.

**Fig. 18. Safety Lock-Box for Switches.**

Courtesy of Commonwealth Steel Company.

**Fig. 19. Safety Lock-Box on Automatic Starting Rheostat.**

Courtesy of Commonwealth Steel Company.

**Fig. 20. Metal Box on Rheostat.**

Courtesy of Commonwealth Steel Company.

**Fig. 21. Guarded Sand Mill.**

Courtesy of Commonwealth Steel Company.

**Fig. 22. Post Drill Guard.**

attached so that a repairman may lock the door, leaving the switch in the position that he desires, and be sure that it will remain so until he changes it.

On all motors that have the E. C. M. automatic starting rheostats the type of box shown in Fig. 19 is used. The protruding handle of the knife switch may be pushed in or pulled out to make or break the circuit. Note that the handle is jointed so that when it is in the off position, a portion of it falls by gravity. It is impossible for anyone to accidentally push it into contact and start the machine. This figure shows the repairman's safety lock in position so that the switch cannot be thrown until it is removed. Fig. 20 shows the type of metal box which has been placed around each of the starting rheostats to protect men from being shocked or burned by arcs. It is of No. 11 sheet steel and is lined with asbestos.

The sand mill is guarded, as shown in Fig. 21. It may be seen that this machine is enclosed completely with

Courtesy of Commonwealth Steel Company.

**Fig. 23. Guarded Surfacer.**

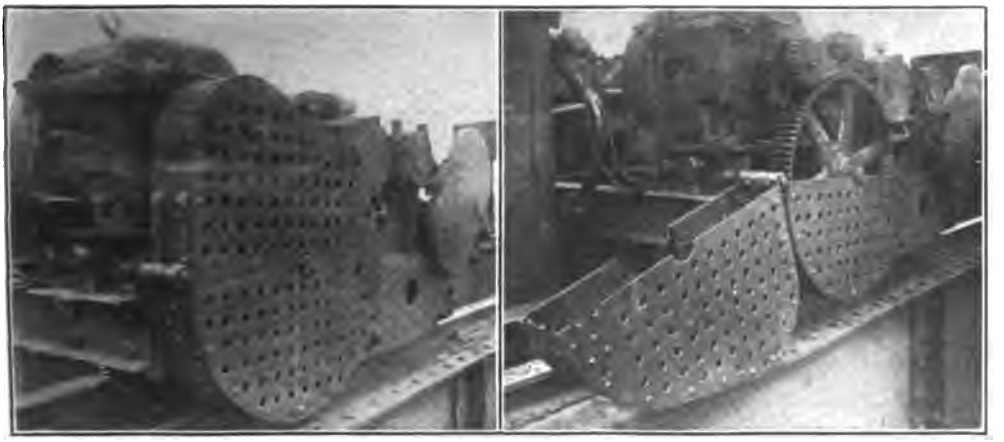
Courtesy of Commonwealth Steel Company.

**Fig. 24. Guarded Band Saw.**

sheet steel and wire mesh partitions and that the driving pinion is covered. Note the spill-way chute provided for charging from the wheelbarrows.

Anyone who has had occasion to work about wood working machinery knows how slippery the floors become and how one must be always on the lookout to avoid falling. The condition was recognized and Figs. 22, 23 and 24 show how non-slip and rubber matting has been used to guard against the hazard. Note the guarding around the belt of the post drill (Fig. 22), the belt guards on the surfacer (Fig. 23), and the housing on the band saw (Fig. 24).

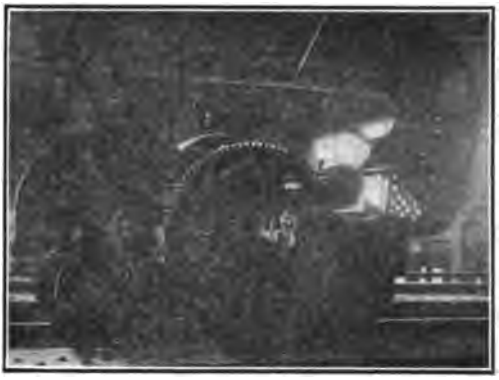
Some decided advantages have been found to exist in the guards for the back gears of a crane trolley, shown in Figs. 25 and 26. The advantages are: First.—They make a complete housing, protecting the gear and the pinion. Second.—The top half may be lifted up readily and thrown back so that the gears may be inspected or greased. Third.—In case of repairs the entire housing may be removed by pulling



Courtesy of Commonwealth Steel Company.

**Fig. 25. Guard on Back Gears of Crane Trolley. (Closed.)**

**Fig. 26. Guard on Back Gears of Crane Trolley. (Open.)**



Courtesy of Commonwealth Steel Company.

**Fig. 27. Completely Guarded Crane Trolley.**

Courtesy of Commonwealth Steel Company.

**Fig. 28. Safety Features on Planer.**

out the cotter pin in the hinge pin. Only a moment is required for removal, and it may be done with the simplest of tools.

Fig. 25 shows the guard closed and Fig. 26 shows it with the top thrown back. At the right in these figures may be seen smaller gear guards of soild metal. Fig. 27 shows a crane trolley equipped throughout with gear guards.

Some admirable safety features, as applied to a planer, are shown by Fig. 28. The saddle guards on the platten prevent men from getting their hands caught in the oil pockets; they also provide protection from chips that fall off of the platten into the ways. The motor pit is protected by railing and toe guard. Pockets in the planer bed are covered by steel plates to prevent use of them as storage places for tools, clothing, etc. Notice the good floor and how the electric switches are enclosed in asbestos-lined steel boxes. Also note how the feed gears on the cross head are guarded.

The guards around the driving belt and pulley of a planer, shown in Figs. 29 and 30, are well designed, and the principle might be applied to other

Courtesy of Commonwealth Steel Company.

**Fig. 29. Pulley Guards on Planer. (In position.)**

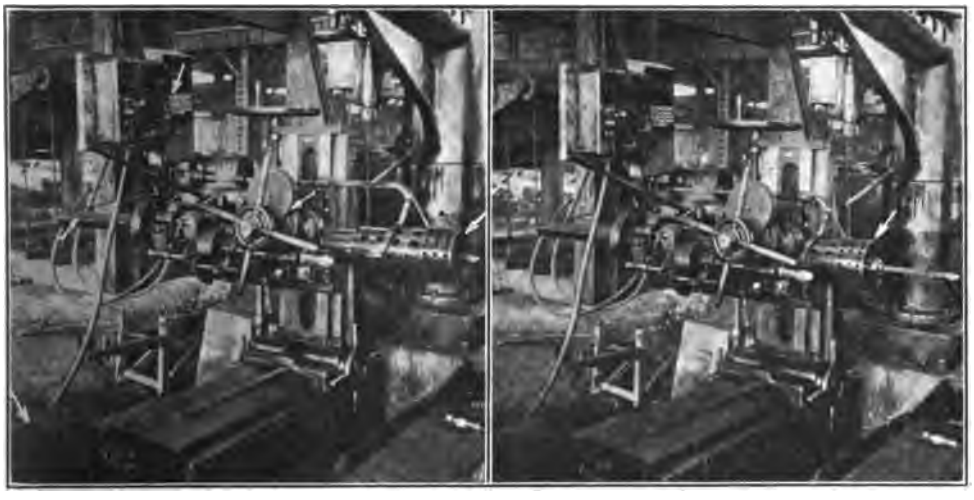
**Fig. 30. Pulley Guards on Planer. (Removed.)**

Courtesy of Commonwealth Steel Company.

**Fig. 31. Guarded Emery Wheels.**

Courtesy of Commonwealth Steel Company.

**Fig. 32. Swing Grinder Wheel Guard.**



Courtesy of Commonwealth Steel Company.

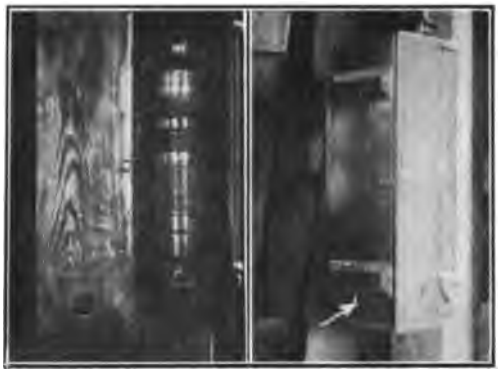
**Fig. 33. Guard for Horizontal Drill. (In position.)**

**Fig. 34. Guard for Horizontal Drill. (Moved.)**

guards with advantage. They are panels of expanded metal on angle iron frames, supported on pipe standards. One man can dismantle them at a moment's notice and move them out of the way. The pipe standards are held in sockets in the floor, and they can be removed readily, thus making a clear space in which to make repairs. Fig. 29 shows the guard in place and Fig. 30 shows it taken down. Expanded metal or punched metal is well adapted for guards of this kind in work shops.

Fig. 31 shows how thoroughly the emery wheels have been guarded. It would be almost impossible for a piece of the wheel to get out of the guard. The figure shows also how the belt is guarded. Note a suggestion box in the background. Fig. 32 shows how the emery wheel of the swing grinder was guarded to protect the operative from injury in the event of the stone breaking.

How a horizontal drill was guarded



Courtesy of Commonwealth Steel Company.

**Fig. 35. Frost-proof Box for Fire Extinguisher. (Open.)**

**Fig. 36. Frost-proof Box for Fire Extinguisher. (Closed.)**

is shown in Figs. 33 and 34. The guarding consists mainly of a collapsible sleeve arrangement which covers the high speed drill, thus preventing an operative from having his clothing caught. The guard is designed so that, when it is collapsed, it automatically shuts off the power. It must be replaced in its proper position before the drill can be started again. Fig. 33 shows the guard in normal position and Fig. 34 shows it collapsed, so that drill may be removed without any trouble. Note how the spindle is guarded on the end opposite the drill; how all feed gears are guarded; how transmission coupling at motor is guarded by hood and the switch box which may be locked by the repairman while making repairs.

To keep the chemical fire extinguishers from freezing, in sheds and other unheated buildings, they were enclosed in boxes, as shown by Figs. 35 and 36. It was found that the box

Courtesy of Commonwealth Steel Company.

**Fig. 37. Interior of Core Oven Building.**

Courtesy of Commonwealth Steel Company.

**Fig. 38. Guard at Railroad Crossing.**

itself was not sufficiently warm to prevent freezing, so an electric lamp was installed in each box which furnished enough heat, even in the severest weather. Holes at the bottom, covered with red glass, make the locations of the extinguishers prominent in the dark.

The core ovens were located formerly inside of the core room, and the smoke and fumes made the conditions under which the coremakers had to work particularly distressing, and the intense heat was almost unbearable. A new oven building was erected, adjacent to the core room. It was designed specially so as to provide the best ventilation and light, thus making a healthier place for the coremakers to work in. Fig. 37 shows the interior of the oven building, with the transfer table about to put a core truck into a core oven. The transmission gears of the transfer table may be seen, as housed, with a guard made accessible by hinged lids for repairs and oiling. The ends of the tracks to the ovens are blocked and filled to the top of the rail to guard against stumbling and possibly the cutting off of a man's foot between the transfer table and the wall. The picture was taken while the ovens were in operation, and it shows the well lighted and ventilated conditions.

Courtesy of Commonwealth Steel Company.

**Fig. 39. Foot Guard for Guard Rails and Frogs.**

How a dangerous railroad crossing is guarded is shown in Fig. 38. The guard consists of a gate, hinged at the right hand side on three strong double-acting spring hinges. When the gate is released from the snap spring hinge at the left, it will automatically swing over the track clear or vice versa, insuring protection.

To prevent men from getting their

Courtesy of Commonwealth Steel Company.

**Fig. 40. Folding Car-Blocker. (In position.)**

**Fig. 41. Folding Car-Blocker. (Thrown off.)**

feet caught between the wing of a guard rail and the main rail, patent foot guards have been installed throughout the yard. Such a guard makes it almost impossible for a person to have his foot caught. Fig. 39 shows the guard in place.

On one rail of all tracks that enter buildings a folding car-blocker casting is placed in position about ten feet outside of each doorway. It was designed to prevent a runaway car from coasting into a building and coming on men unawares. The yard crew will thereby come to a stop before entering a building, thus giving warning to the men working inside. The automatic catch handle which holds the blocker in position may be locked if so desired. The blocker is shown on the track in Fig. 40 and off the track in Fig. 41. Note the latch in the latter figure.

## BETWEEN THE LINES IS SAFETY.

In an effort to help along the "Safety First" campaign, many street crossings in Cincinnati have been marked off into lanes by two white lines about ten feet apart. In the lanes is safety for pedestrians. Drivers do not cross the white lines until signaled by traffic officers. People have been quick to learn that they should not attempt to cross the street outside of the white lines. At the curb at each corner is the warning "Walk Between These Lines." As the painted lines wear off, they are to be replaced by lines of white bricks in the pavement.

The lines are distinct, with spaces between broad enough for persons three abreast to walk in either direction without jostling. The intention to replace the painted lines with lines of white brick indicates that the arrangement for safety is to be permanent. Any city can adopt the excellent arrangement.

# SAFETY ORGANIZATION

*By George A. Cowee, Manager, Bureau of Safety, Utica Mutual Compensation Insurance Corporation.*

MANUFACTURING corporations in all parts of the United States have testified that efficient safety organizations, as conducted in their factories, have, on an average, reduced the number of accidents in their plants at least 50 per cent. In some plants, accident records have been reduced as much as 65 per cent. The industrial accident board of Massachusetts has found that, through the organization of efficient safety committees, the employes of Massachusetts may eventually save on each injury an average of approximately $40. Statistics show that such organizations have saved at least 50 per cent. of the losses in wages sustained by employes on account of preventable accidents. Employers may expect, therefore, to ultimately save the entire cost of insurance on the preventable cases. At least 60 to 70 per cent. of all accidents are preventable. No employer should, if he desires to make it a success, organize a safety committee solely for pecuniary gain. Humanitarianism should be the primary motive to inspire employers to perfect such an organization.

It is, first, necessary to convince employes of the sincerity of the safety work; also that the prevention of needless accidents is for the good of all employes as well as the company. Employes should be made to understand that sustaining serious accidents which may dismember them will greatly reduce their future earning power. They should also be made to realize that it costs the company a considerable sum of money to educate them to perform the work for which they are engaged. When an employe, familiar with the operation of a certain machine, is injured or disabled seriously, it becomes necessary for the company to educate another man to occupy his position. That costs money. It directly reduces the profits of the company. Not only that, it entails untold suffering for the injured workman and his family. The law does not provide compensation for pain, suffering and dismemberment. Therefore, the prevention of accidents is a direct benefit to employer and employe. Each should put forth his best effort to eliminate preventable accidents.

The education of workmen in any factory is an important and serious problem. In factories where foreigners are employed it becomes a great problem. It is often difficult to secure the co-operation of the employes in a safety campaign. Many of the large plants interest their workmen through motion pictures and illustrated talks and lectures. A company of average size may print small monthly bulletins containing several photographs of dangerous machinery, safeguards, unsafe places, unsafe practices and methods of correcting them.

Some suitable distinction or award is necessary to create a spirit of interest and enthusiasm among employes. Many companies offer cash prizes to workmen for valuable suggestions. Some pay at least $1 for every unsafe place or practice brought to the attention of a safety department.

Workmen's committees are especially important. These should consist of several workmen from each department. Monthly meetings should be held for the discussion of accident prevention. The personnel of each committee should be changed every six months. The workmen should be allowed to appoint their safety inspector who should serve for a period of one month. An inspector should caution other workmen against any unsafe practices as observed. He should report unsafe machinery or working place to the safety committee.

Foremen can do much to secure the interest and support of the workmen. They can do more than others in the plant to make the safety organization

a success. If a workman believes that his foreman is sincere in his desire to prevent accidents, promulgate the proper use of safeguards, and eliminate unsafe practices, he will usually attempt to carry out the foreman's wishes. Foremen who are not willing to take up the work of accident prevention in an enthusiastic manner should not be retained in the employ of a company.

Foremen should give special attention to instructing the men, especially the new men, in the safe methods of performing their work. They should direct the attention of workmen to the dangers which surround them; also to any dangerous condition which may arise in the course of their work.

Each company should impress upon the mind of each workman that the men who take an active interest in the prevention of accidents, make recommendations for eliminating unsafe conditions, send in suggestions regarding unsafe practices, are to be considered in preference to others for promotion and advancement. With a view toward encouraging workmen to report unsafe practices, the company should give assurance to all employes that nobody is to be disciplined, if reported once. If a workman indulges in unsafe practices, he should be taken to the safety committee for a heart-to-heart talk. If he disobeys instructions he should be discharged. Coaxing, rather than mandatory methods, should be employed in securing the co-operation of the men.

It has been found that, where employes undergo physical examinations by a company doctor, or a doctor engaged by the company for such a purpose, a great many defects existed in the health and condition of workmen, which would otherwise have remained unnoticed. For instance, a workman may be hired one day who is apparently a strong, healthy man. At the expiration of two or three days he may put in a false claim for several thousand dollars for an injury that resulted in a case of hernia. It may be found that the man sustained the injury while lifting heavy material prior to his employment by the company. Nevertheless, the workman may be awarded compensation because of the inability of the company to submit sufficient evidence that the accident happened prior to his last employment. A case of this kind could have been averted only by a physical examination.

Many men are found, suffering from hernia, who do not even wear trusses, yet they are engaged in the work of lifting heavy objects. If a man continues to work without proper treatment, his physical condition is impaired further. Numerous cases of tuberculosis, besides other chronic afflictions, are discovered. A physical examination enables the management to place men at the kind of work for which they are fitted. This is another factor which tends to increase efficiency and minimize casualties.

Intoxicating liquor is an important agent in the causation of accidents. A campaign to eliminate the use of liquor among the men, especially before coming to work, should be inaugurated. To secure results this must necessarily take the form of an individual campaign. The men should also be requested to abstain from coming to work in case they have been drinking heavily the previous night. In no case should the men be allowed to use liquor on the premises.

Some progressive companies have formed first-aid organizations to supplement the safety organizations. In order that employes may be educated in the fundamental principles of first-aid, sanitation and hygiene, practice drills, talks and lectures are on the programme.

Every intelligent man should know at least one method of resuscitating by artificial respiration a workman suffering from asphyxiation. The methods are simple. Treatment by artificial respiration is necessary in most cases of severe electric shock; in cases where the victim is suffering from the inhalation of poisonous gases and fumes; in a case of drowning; or in any other instance where the respiration of the victim has stopped or is

very weak and irregular. Employes should also be compelled to realize the importance of having all wounds dressed immediately by a physician or by someone with the proper qualifications. Every wound or abrasion, or even a scratch, should receive immediate attention. Otherwise, if the wound is not disinfected, dressed properly and covered, blood poisoning may result. A surprising number of deaths and amputations result from lack of attention to these simple but important details.

## ELECTRICAL ACCIDENTS IN MINES.

In his annual report submitted to the Secretary of the Interior, Dr. Joseph A. Holmes reviews the investigations made by the Bureau of Mines to safeguard the miners from electrical accidents. Director Holmes makes the declaration that not only have many men been killed or injured from what are believed to be unnecessary electrical accidents, but indirectly electrical apparatus has been responsible for mine explosions and mine fires that have extensively destroyed both life and property.

He further says that, through the activity of the bureau in calling attention to dangers heretofore unappreciated in the use of electrical machinery, manufacturers have devised safer types of apparatus and States have enacted stricter laws governing electrical installations.

Much attention has been paid to the proper construction and use of electric and other safety lamps. Tests have been made to ascertain the comparative merits of different types of safety lamps, including their usefulness in furnishing light to miners, their relative safety, and their value in indicating the presence of explosive gas. The well-defined principles that govern the mechanical construction of a modern safety lamp have been largely exploited in this country by European manufacturers and covered by patents in this country. During the past year some of these patents have expired and in consequence American lamp manufacturers and lamp agencies have been inspired to develop new models. Already an improved safety lamp of American manufacture has appeared, and samples of others have been received by the bureau for examination and criticism. The bureau has studied all types of safety lamps on the market and as a result has prepared a schedule of official tests to be used in establishing a list of permissible safety lamps for use in gaseous mines.

At the beginning of the year the bureau's requirements for testing explosion-proof motors had been prepared and published. The work was necessary because no successful explosion-proof motors had been developed in the United States. During the year only one motor was submitted for test, but this machine passed the tests successfully. It is believed that the bureau's approval will stimulate other manufacturers to renewed activity in producing such motors.

In the investigation of the ignition of coal dust by electric flashes, valuable results have been obtained. Coal-dust ignitions have been obtained under practical underground conditions with currents of surprisingly low voltage. The danger of dust explosions being started by such currents has been shown, but the work needs to be continued to determine the extent of the danger and how it may be nullified.

## "SAFETY FOR YOU AND ME."

H. L. Brownell, safety inspector of the Chicago surface lines, has issued a leaflet on "Safety for You and Me." Small children, he says, should be taught caution and safety, and not fear, "not to fear the cars and autos, just to go carefully." An instruction for older children, if about to cross a street, is to not run behind a car; do not run across in front of a car or wagon, because an automobile may be on the other side, moving faster. Take time to see what is coming; then move on a fast walk; "don't run." The first of the safety golden rule for grown-ups is: "Safety, scientific right thinking. Think right, and you will act right. Look at it from the other fellow's viewpoint."

## COLLISION ON ELEVATED ROAD.

When a black fog enveloped New York City in the early hours of the morning of February 6 a crowded local train crashed into an express train on the Ninth avenue elevated railroad at Fiftieth street. Thirty-seven persons were injured, seven seriously. Two of the cars caught fire. The collision was due to the fog and a misinterpretation of orders. The passengers on the express train escaped easily, because they were near the platform of the station. The passengers on the local train were compelled to find their way along the boardwalk at the side of the track to the Fifty-ninth street station.

**Passengers are not safe in wooden cars.**

The passengers were panic-stricken, and police patrolmen and firemen were sent to assist them to the street; some were almost overcome by smoke that entered the cars.

The official report to the Public Service Commission said that the motorman of the local train was not able to see ahead far enough to avoid the collision. The train telescoped the last car of the express train and caused it to be derailed. The trucks of the car, through contact with the third rail, caused a short circuit that set fire to two cars. The report said also that the equipments on both trains were in good condition.

That morning two elevated trains were in collision on the Williamsburg Bridge. Ten persons were injured slightly. A ferryboat of the Ninety-second street line crashed into a pier at Astoria. Thirty persons were injured slightly.

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## THE MILLS AT NIGHT.

The wind comes damp and chilly from the marshes still and white
To lift anon the sombre shroud above the fitful light
Made from the glare of furnace stack, converter and cupola,
That casts weird gleams and shadows o'er the toiling men below.
The night air vibrant to the sound of darting engines scream,
The rumbling grind of metal wheel, the shriek of hissing steam,
The brazen clang of warning gongs peal out their raucous tale,
The vessels' roaring mouths belch forth a rain of fiery hail.
The creak and whine of monster cranes that hover high in air
O'er seething pit and furnace, to raise with cunning care
The whitehot ingots from their depths of flame and glowing coals,
To speed o'er endless tables through giant bloomer rolls.
The arcs' cold rays shine down upon the sweating, straining forms
Of silent men, with eyes alert, bared chests and brawny arms,
All through long hours of grinding toil, upon their visions burst,
Humanity's great slogan signs: "Be Watchful!" "Safety First!"

LYNN OSMER.

# NATIONAL SAFETY COUNCIL

*IN THIS DEPARTMENT WILL APPEAR ARTICLES AND NEWS CONCERNING THE NATIONAL SAFETY COUNCIL AND ITS LOCAL COUNCILS, FURNISHED EXCLUSIVELY TO "SAFETY ENGINEERING"*

## NEW LOCAL COUNCILS.

SINCE the publication of the January number of SAFETY ENGINEERING, two new local councils have been chartered by the Executive Committee of the National Safety Council, namely, Columbus, Ohio, known as No. 19, and Baltimore, known as No. 20. Preparations are being made for the organization of local councils in many other cities, including Niagara Falls, N. Y.; Racine, Wis.; Birmingham, Ala.; Dayton, Ohio; Indianapolis, Ind.; Los Angeles, Cal., and other important cities.

## YOUNGSTOWN COUNCIL NO. 2.

MEETING, January 19, 1915; 55 members present. W. J. Warnock, vice-president, acted as chairman in the absence of Dudley R. Kennedy, president. J. M. Woltz, secretary, recorded the minutes. The chairman stated that the meeting was called to discuss participation by the council in several aspects of the public safety problems of Youngstown and its vicinity.

THEATERS AND MOVING PICTURE SHOWS.—After discussion a resolution was passed appointing a special committee to investigate the safety problems of theaters and moving picture shows. A committee was appointed to call upon the city officials and ascertain the procedure of the proper authorities in inspecting theaters and other public places, and to follow up the work of its officials and see that proper protection was provided as required by law.

LIFE SAVING AT LAKES.—Another committee was appointed to interview the park commissioner and ascertain the city's requirements in life-saving apparatus at lakes in the vicinity of Youngstown. A suggestion will be made to the park commissioner that the city provide at least one life-saving man at each lake for the purpose of safeguarding the lives of visitors to the lakes.

SAFETY TALKS TO WORKMEN.—A discussion followed on the importance of safety talks to workmen at the plants by well qualified safety inspectors.

PHYSICAL EXAMINATION.—Arrangements were made for a speaker to address the members at the next monthly meeting on "Physical Examination of Employes," with lantern slides.

## CHICAGO COUNCIL NO. 3

MEETING, January 13, 1915, at Fort Dearborn Hotel, Chicago. Dinner at 6 p. m.

EMPLOYER AND EMPLOYE.—Alexander Shane, vice-president of the council, read a paper entitled "Arousing Interest of the Employe in Safety Work," and in a large measure put the responsibility for the lack of interest upon the employe. A. H. Young differed with Mr. Shane, and held that the interest in safety work is fundamentally the employe's, but the responsibility the employer's. A representative of the National Malleable Casting Company insisted that the employe must bear a certain share of the responsibility, and referred to the large reduction

in accidents in his properties through educational work. Mr. Heelan referred to one specific responsibility obviously up to the employe, that of notifying his superiors where he was cognizant of unsafe practices. Mr. Brownell referred to the fact that many of the employes were not in a position to have a broad viewpoint; they did not realize dangers, except those closely associated with their own work. He said the employer must be held responsible for the safeguarding of his people. The secretary pointed out that responsibility should be associated with power; that the employer had the power to install guards, and force obedience to rules, and that he, therefore, was responsible for that phase; while the employe, who has control of his own actions, should be held responsible for his personal carefulness. Mr. Gilkerson divided "Safety Work" under the headings of Economical, Civic, Sociological, Ethical, and Humanitarian.

"A TRAIN WRECK."—An interruption was made at this point to run a moving-picture reel, loaned by Dr. F. D. Patterson, entitled "A Train Wreck." Interesting pictures were displayed, showing a head-on collision of two passenger trains and the effect of such a collision on wooden cars.

THE SUB-FOREMAN.—Two men, representing the Illinois Steel Company, referred to the weight of responsibility which the sub-foreman carries, first, as representing the company; second, as representing The Man On The Job.

THE CHILDREN.—Mr. Brownell had the last word, referring to the results obtainable through the children of the employe.

STATISTICS.—Mr. Sercombe, of the Coroner's Office, gave an extremely interesting talk on the need of statistics as a means of interpreting facts.

## LEHIGH VALLEY COUNCIL NO. 5.

MEETING, Friday, January 15, at 2:15 p. m. Subject for discussion was "Ways and Means of Carrying On Proper First Aid in Industrial Plants and What Is Being Accomplished." The discussion was opened by Dr. W. T. Davis, of the American Red Cross, Washington, D. C., with an interesting talk, in which he demonstrated the principal points involved, using various members of the council as subjects. The doctor's talk was instructive and practical. An enthusiastic discussion followed, various phases of modern first-aid being discussed in detail. Several of the members had brought their head foremen, many of whom entered the discussion, giving interesting bits of experience which demonstrated to those present the real value of proper first-aid in all cases of injury to workmen, whether slight or serious.

FIRST-AID TEAMS.—As a result of this meeting several of the members of this local council are organizing first-aid teams in their plants, where heretofore one man has been doing this work in each. These teams are to be drilled in modern first-aid, and it has been suggested that competitive drills be held under the auspices of Lehigh Valley Local Council, No. 5, suitable prizes being awarded to the winners of such contests. It is likely that competitive drills may be held some time in the coming summer, and this might be a suggestion to other local councils of the national body. This is one of the means of keeping alive interest in one particular branch of safety work, and it is worthy of a fair trial.

## PITTSBURGH COUNCIL NO. 6.

MEETING on January 8 at 8 p. m. President R. L. O'Donnel delivered an address, in which he described the work of the National Safety Council and the objects of the local council. He said that the organization of the local council would give an opportunity to employes and employers to meet on common ground and discuss for their own welfare anything along the line of industrial safety that was useful somewhere else and might be desirable for adoption in local plants. The local council had been organized with the object also of gathering the best from the individuals who have charge of the safety work in the plants. The desire was to assist all who

might need assistance and to promote well known and scientific methods in the prevention of accidents, giving attention to small plants as well as large plants; in general, he said, to initiate, promote, cooperate with and obtain the assistance of any and all activities or agencies calculated to conserve human life in the nation's industries, and to participate in and aid other activities for the welfare of the industrial workers of the country.

C. E. Ralston, safety engineer of the Jones & Laughlin Steel Company, delivered an address on "Carelessness of Men," and C. B. Auel, director of standards, processes and materials of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, read a paper on "Education in Safety Work."

FACTORS OF ACCIDENTS.—Mr. Ralston said the State Board of Labor and Industry of Pennsylvania recognized one of three factors as entering into every accident—defective equipment, lack of safeguards and careless methods. "The first two can be eliminated largely by the proper expenditure of time and money, but the last one is the greatest problem to be solved by safety experts. When we consider careless methods or the carelessness of men we are confronted with a problem which deals almost entirely with the human mind. The student of human nature can ask for no better subject than a gang of men laboring in our industries, where will be found, working side by side, the steady, careful worker, who plans every move, and the careless worker, who acts without thinking of himself, his family, his fellow-workers, or the property of his employer."

COMMON ACTS OF CARELESSNESS.—A few of the most common acts of carelessness around the steel mills and ones which have caused much trouble are:

Improper loading of cars or hand dummies, by failing to place blocks under the material handled, which will permit the proper placing of chains and also prevent the rolling of the load in transit.

Improper placing of chains on loads to be carried by cranes, permitting the loads to shift or swing.

Placing blocks on top of loads, endangering other workmen, while the load is being handled by the crane.

Walking under loads suspended from cranes, and on the part of cranemen, the carrying of loads over the heads of workmen.

Unloading brick, tile or metal from one side of a buggy, causing it to tip over on men working on the other side.

Using hand or crow bars on power driven roller tables while same are in operation.

Working overhead without placing a flag or other warning sign, to warn people underneath.

Starting machinery without first making sure that all workmen are out of the danger zone.

Coupling and uncoupling cars from the inside of curves.

Cleaning and oiling machinery while same is in operation.

Searching for gas leaks with open hand torches.

Failing to wear goggles, while chipping, when same are provided.

Failing to replace safety guards after making repairs.

Using mushroomed or burred tools.

EDUCATION OF WORKMEN.—When men are working to accomplish a given task, Mr. Ralston said, most of them think only of the result and give no thought to the methods by which the result is to be accomplished. This can only be overcome by education, which will not only teach the men to think but also make them feel the responsibility resting upon them, and until this responsibility is felt by the workingmen one cannot expect to make our industries safe. This education cannot be accomplished in a day, or a week, but will require time and patience on the part of foremen and all those in charge of the men. The men must not only be told, but they must be shown, how to work safely and efficiently.

RESPONSIBILITY OF FOREMEN.—This educational work naturally falls upon the foreman and superintendents, assisted by the various safety organizations. The laborers, piece-workers and tonnage men are the men who are paid for product, while the foremen and superintendents are responsible for supervision and methods, as well as the safeguarding of the employers' interests. As a careless workman is a menace and an expense to

any company, so the foreman or superintendent, who fails to look properly after his men and their methods of working, is a menace, not only in failing to prevent his men from being injured and disabled, but in exposing his employer to unnecessary expense and law suits for damages.

BURDEN ON EMPLOYERS.—It is almost impossible to estimate the expense and waste caused by acts of carelessness in our industries today, the speaker said. The men, through failure to understand the responsibilities resting upon them, suffer pain and loss of time; their families are deprived of the necessities of life, while the employers are compelled to pay the bill, not only the expense of caring for the injured man but also to fill his place while he is disabled and replace the equipment damaged or destroyed. "As the burden of carelessness falls upon the employer, we must accord him the right to discipline. All careless workers should be eliminated from the more hazardous jobs and kept away until such time as they can be trusted. In most cases a reprimand from the superintendent will have the desired effect, while in other cases it is necessary to give the offending worker a few days' vacation to think the matter over. Only as a last resort and in very extreme cases should a man be discharged for carelessness."

RESPONSIBILITY OF MANAGEMENT.—Mr. Auel said that, to those who had given the safety movement only a passing thought, it would be no doubt a surprise if told that, after organization, education would play a larger part than any other single factor. He explained that education in the line of safety must commence with the management of every organization. Having placed safety work on a routine basis, steps should be taken to investigate all accidents and to record the details of each, with a view to preventing, if possible, their recurrence. "Although certain accidents are now properly classed as being due to the hazard of the industry, and for which, in the light of present knowledge, no one is therefore to blame, there will ultimately come a time when this will be practically eliminated and every accident put up squarely to employe and employer. With suitable records provided, the causes of accidents can be studied, the relation of each to every other kind and to the total can be compared, and so on. Such analyses will then enable definite conclusions to be drawn as to what steps, additional to those already instituted, must be taken. In safety work sight should not be lost of the fact that for approximately two-thirds of every working day a worker is his own boss, so that during the greater portion of his time he can, by his methods of living, render himself either fit or unfit to perform a day's work. It is, therefore, obvious that safety education must extend into the home, but it is not so obvious as to how this may best be done."

## PHILADELPHIA COUNCIL.

**No. 7.**

MEETING on January 19, in the Franklin Institute.

President James B. Douglas called the meeting to order at 8:30 p. m. Seventy-five persons present. George W. Elliott, city fire marshal and the principal speaker of the evening, delivered an interesting address on "Fire Prevention In Our Own City." He asked the council to do everything in its power to co-operate with the city fire department.

THREE CLASSES IN FIRE PREVENTION.—A statement was that fire prevention divided itself into three classes; first, the group representing the home and private dwellings; second, business houses and large buildings, and, third, the city. The speaker said that in Philadelphia in the past year fires were confined to many private dwellings; that it, however, was typical of all cities; that 87 fires were caused by children, playing with matches, and that 651 fires, out of 2,000 in residences were due to numerous causes attributed to neglect and carelessness.

FIRES IN RESIDENCES.—In reference to the first group, the home, Mr. Elliott said that the importance of impressing upon every householder the necessity for exercising the care and diligence which they should take in the ordinary interest of their homes toward keeping such things in order

as will tend to start a fire cannot be brought too strongly to their minds; that the fires in residences play a most important part in the millions of dollars lost every year in conflagrations, it being alleged that the loss through fires in this country averaged 8 cents a second. He urged upon the members of the council not only to have the "Safety First" principle in mind, as far as their places of business were concerned, but, also, in their homes; that they should never lose sight of this matter and should bring it to the attention of the public whenever an opportunity arises. He said also that the inspectors of the fire department in the past year removed 12,000 piles of rubbish from private dwellings, which corroborated his views that if each individual would take ordinary precaution toward seeing that everything in his home be kept in its proper place, it would certainly be a step in the right direction.

BUSINESS HOUSES.—He said that occupancy governed the conditions of fires as they occurred in cities like Philadelphia, the danger of fires being increased greatly by certain classes of stores, offices, factories, etc. In the city last year there were 42 fires in cigar stores which were, in all probability, due to men throwing lighted matches on the floors or leaving lighted cigars and cigarettes on counters or tables; 30 fires in clothing stores; 46 in garages. Wholesale groceries only had 4 fires, whereas there were 88 in retail groceries. The proportion of the latter is much greater than the former, but every wholesale house is about ten times as large as an ordinary retail store. Ten fires in chain grocery stores were due to boys leaving lighted candles on boxes in the cellar, rubbish being allowed to accumulate, etc. Restaurants had 39 fires; smokehouses, 99; unoccupied dwellings, 133.

OCCUPANCY.—Mr. Elliott mentioned the latter in order to strengthen his assertion that occupancy is a most important factor, because tramps seek refuge in empty houses and they, as well as any other persons uninterested in the welfare of the house, start fires through carelessness. He said also that the fire department could not get the owners of buildings to realize the amount of money that could be saved through the medium of complying with the recommendations of the inspectors of the fire department, whose suggestions are often misconstrued to mean that they are endeavoring to sell a safety device, or something of that nature. Some of the recommendations have been accepted in the proper spirit and carried out, but the inspectors are unable to get the owners of buildings to take the proper interest in the warnings and suggestions at all times or co-operate with them. Unless this is done they could not hope to improve the conditions. It is the opinion of business men throughout the country that most fires can be eliminated by sufficient care.

CITY'S WORK.—In regard to the last group mentioned, Mr. Elliott said the city was trying to enforce the adequate law, but the department was without money or men to see that it was lived up to in all its phases. It was intimated that it was the common opinion of the vast majority of the people that all the city had to do was to put the fire out and not take measures to eliminate fires. He said that in the past year and a half about 154,000 buildings were inspected and suggestions made in the interest of safeguarding them, and that about 112,000 improvements were made. The fire department is working hard, with the limited force at its command. Nobody could estimate the amount of work done. The interests of the council and the city toward preventing fires can be accomplished only by cooperation.

After suggestion by the chairman, several questions were asked in regard to the city's attitude in connection with several buildings which were supposed to be "firetraps," and the matter was explained to the apparent satisfaction of the person who propounded the questions.

Capt. Philip S. Tilden said that, on looking into the matter some time ago, he was surprised to learn that the

fire laws were not more stringent. His firm is doing everything it can to help the fire department in its work. He thought the fire prevention force should be doubled, and that everybody should render Mr. Elliott all the assistance possible in his work.

On motion of Mr. Forster, a rising vote of thanks was extended to Mr. Elliott for his address.

Mr. Douglas introduced Mrs. Edith W. Pierce of the bureau of highways as "the only woman highway inspector of the east." She read a paper on "Safety on Highways," outlining certain specifications that have been issued by the bureau of highways in the interest of clearing the streets of rubbish, spreading cinders on the streets in the business section of the city in icy weather, etc. She said that the personal aspect of safety was the value of education of each individual in the matter. Safety is a working science and one must not only get the safety habit but spread it abroad as much as possible. She read a comprehensive letter issued by Mr. Winchell, director of traffic of the Union Pacific Railroad System, asking the employes of the road certain questions that pertained to their welfare and the interest of the company, with a view of rendering efficient service. She suggested that the local council inaugurate a system of public lectures, as is in New York City, stating that the method would bring the question of safety before the eyes of the public in an interesting way.

ADDRESS OF PRESIDENT DOUGLAS.—"During the year, ending this evening, eleven meetings of our council have been held. The first meeting was held on January 20, and the certificate of permission to organize was received from the parent body under date of January 23, 1914. Work was immediately begun on the preparation of a constitution, and after several meetings our constitution was adopted on March 5 and printed. Consent was secured from 45 leading citizens of Philadelphia for the use of their names as honorary vice-presidents. It was decided to hold public meetings in Franklin Institute, the home of the oldest engineering association in the United States.

"Previous to April 28, 1914, when our first public meeting was held, the meetings consisted principally of round-table talks on matters of organization and practice in accident prevention. Public meetings were held on April 28 and May 28, when it was decided not to hold meetings in the summer months. On September 24 the council met in conjunction with the Home and School League and held a 'Symposium of Safety' in the Bellevue-Stratford Hotel. Other public meetings were held in Franklin Institute on October 28 and November 20. On the latter date the council was privileged to have present R. W. Campbell, president of the National Safety Council.

"During the year the meetings were addressed by 25 persons, authorities on their respective subjects, who spoke on Safety First on the Highways; Shop Practice to Avoid Accidents; Educational Safety Work; Preventing Foundry Accidents, etc., etc. Six of the eleven meetings have been open to the public. At the public meetings, including the symposium in the Bellevue-Stratford, the estimated average attendance was 125.

"Our year closes with an individual membership of 52, drawn from the following: Philadelphia Electric Company, Bell Telephone Company, Merchant & Evans, J. G. Brill Company, United Gas Improvement Company, American Pulley Company, Independence Inspection Bureau, Pennsylvania Department of Labor and Industry, Pennsylvania Railroad Company, Electric Storage Battery Company, Central Labor Union, Harrison Brothers, Philadelphia Rapid Transit Company, W. F. Taubel Company, Quaker City Rubber Company, Associated Automatic Sprinkler Company, Sutro & Company.

"On October 13 it was my privilege to attend the third annual convention of the National Safety Council in Chicago, and, as representing Philadelphia Council, to report the progress

made. On June 17 and on November 13, as of the Philadelphia Safety Council, I had the pleasure of addressing meetings of employes of the Raritan Copper Works, Perth Amboy, N. J., and the Reading Chamber of Commerce, on the subject of works' safety.

"Our membership has not grown, as I feel we had a right to expect, but, now that the council is established as an active body, I believe the new officers to be elected this evening will be able to make a gratifying showing in the way of increasing membership during the coming year, particularly in view of the fact that a workmen's compensation law will in all probability be enacted at the session of our legislature, about to begin.

"I feel that we should be able to make some arrangement whereby associate members would be recognized at the meetings of our local council; such members, however, not to receive the weekly literature and other benefits from the National Safety Council, nor to be entitled to take active part in its affairs. I believe that such an arrangement will be worked out in the near future. The executive committee is said to be considering favorably our invitation to hold the next annual meeting of the National Safety Council in Philadelphia."

## DETROIT COUNCIL NO. 8.

MEETING in the auditorium of the Board of Commerce at 8 p. m. J. M. Eaton, chairman of the program committee, presided in the absence of L. B. Robertson, president. E. D. Alexander acted as secretary. Attendance, 800. Mr. Eaton made a preliminary address, emphasizing the importance of the cooperation of workmen in the safety movement, and introduced A. H. Young, supervisor of safety and labor, of the Illinois Steel Company, South Works, South Chicago, who delivered an address on "Interesting the Men in Safety Work." Mr. Young spoke on the various factors involved in accident prevention work and described at length the experience of the Illinois Steel Company from 1906 to date. His main address was followed by an exhibition of stereopticon slides. Many of the workmen asked leading questions, and there was every evidence that a great impression had been made upon the minds of the workmen.

## ROCHESTER COUNCIL NO. 9.

MEETING on January 21, in the rooms of the Rochester Chamber of Commerce. President J. A. Robertson acted as chairman. The meeting was devoted to a discussion of the report and specifications of the standardization of safeguards committee of the local council, presented by L. B. Somerby, chairman. A part of Mr. Somerby's report is:

SAFEGUARDS COMMITTEE.—Approval of appointments on this committee were made by the executive board on June 10, 1914. The committee consists of L. B. Somerby, chairman; J. C. Parker, Rochester Railway & Light Company; H. E. Akerly, Eastman Kodak Company; A. E. Veness, G. W. Todd & Company. Meetings were held June 24; July 8; July 22; August 5; August 19; September 2; October 6; November 18; December 24, and January 13.

SAFEGUARDING MACHINERY.—On account of the new requirements of the labor law at about the time the committee was appoined, it was decided to take up the question of safeguarding machinery, as the committee considered this one of the most important questions confronting the manufacturer at that time. It was also recognized that the new branch of the labor bureau entitled the industrial board and also the workmen's compensation act, in conjunction with merit rating, would require immediate attention to this subject.

SPECIFICATIONS.—After dwelling for some time on general specifications, it was decided that it would be of a more direct advantage to manufacturers if the committee, instead of making general specifications, which would necessarily have to be very broad, would take up dangerous machines and other conditions individually This rule was adopt-

ed at one of the early meetings, and the rules have been drawn up in the form of specifications and numbered in order that same may be indexed and easily referred to. It was recognized also by the committee that the council was a safety organization and it has considered the matter of "Safety First" in drawing up the specifications.

ELECTRIC-DRIVEN MACHINERY.—Following the specifications are proposed rules for electric-driven machinery. These specifications and rules will be presented for consideration and criticism and decision as to what final action shall be taken in the matter. It was the earnest request of the committee to members to not hesitate to criticise, condemn, or approve as each individual case might appeal to them. The committee drew up a list of manufacturers of industrial safety devices. These lists have been numbered and an individual sheet allotted for each list in order that names may be added, if desired.

Following the presentation of the report, Stephen W. Tener, manager of the accident and pension department of the American Steel & Wire Company, Cleveland, Ohio, delivered an address, accompanied by stereopticon slides, and took part in the general discussion on the specifications for safeguards. The final action on the report of the committee was to refer it back for consideration of the suggestions made at the meeting before final adoption.

## GRAND RAPIDS COUNCIL NO. 13.

MEETING on January 18. E. K. Prichett, president, acted as chairman. E. A. Meves, secretary, reported the proceedings. The meeting convened at 8 o'clock. The first topic discussed was: "What Methods Do You Employ to Prevent Accidents Caused by Dangerous Piling of Materials, Falling Objects, and Slipping Ladders?"

LUMBER PILING.—With reference to the dangerous piling of materials, Mr. Richardson of the Macey Company explained how he secured his lumber piles to prevent a strong wind blowing off the top courses and causing possible injury to someone below. His method is to fasten the covering boards and the last three or four courses together by placing a few narrow boards across the top of the pile at the front, middle, and back and attaching wires to the ends of these boards, fastening them three or four courses down.

LOADING OF FACTORY TRUCKS.—Mr. Yeomans of the Imperial Furniture Company said that they have very little trouble with stock being piled too high on trucks. Orders are strict in regard to this and, if a truck is piled too high, the man who piled it is forced to lower it to the prescribed height and put the excess on another truck. Mr. Merrill of the American Seating Company said that although they have had no accidents thus far from piling trucks too high, they have had several near accidents. In some of their rooms the belts are quite low. To prevent this cause for accident, they have safety signs placed above the extreme loading height. In this way it is impossible to pile a truck too high and get past the belts without the top of the pile being knocked off. He said also that one of the walls of the warehouse was forced out by the strain of material piled against it. To prevent that the material is now piled so as to place the strain of the piles on each other. Mr. Gormley of the American Seating Company suggested that it would be well to have a blackboard at the meetings. In that way many details could be brought out and illustrated.

FALLING OBJECTS.—With regard to falling objects, Mr. Prichett said that accidents happened frequently when lumber was being put in the kilns. When the cars are pushed into the kilns, the tops of the piles may strike a projection and part of the load may be knocked off. Although there have been no accidents recently, some time ago several people were injured in this way. Mr. Richardson said his practice was to draw the piles in at the top, starting at about the fourth course and drawing it and each succeeding course in about four inches on each side. All men should be cautioned when taking lumber out of the kilns. There are dangers in removing lumber from the kilns the same as in

loading it. Mr. Yeomans said that a foreman stands at the bunks when they are put in or taken out. They also draw their piles in at the top.

LADDERS.—In regard to the slipping of ladders, Mr. Meves of the Excelsior Wrapper Company said that statistics show a very large number of accidents are caused in this way. It is a constant element of danger in every factory. Mr. Lund of the Valley City Machine Works said that accidents of this kind happened most frequently on hardwood floors. To prevent accidents, he suggested the use of a segment of a saw attached to the bottom of each leg of the ladder. Mr. Yeomans said that the Imperial Furniture Company used points of hardened steel on their ladders and have no trouble with them. Mr. Campau, secretary of the Furniture Manufacturers' Association, explained two kinds of points or lugs for use on ladders. One is made of cast iron and carborundum chips and the other is made of lead and carborundum chips. While he favored the composition of lead and carborundum chips, he said that both were excellent for uses of this kind on any floors. They require absolutely no care and are effective at all times. Mr. Merrill related an accident in which a truck struck a ladder and the man jumped and sprained his ankle. All of the ladders in the factory were then examined. After making and trying several different shoes, they finally decided to use one of the commercial devices, which had proved successful.

EXPENSE OF SAFETY DEVICES.—In reply to Mr. Prichett's question as to the expense of safety devices, Mr. Merrill said that most of those they use were made in their own factory and the rest were very inexpensive.

REPLACING BELTS.—Mr. Lund said that he had made a rule in his factory that, when his men went up on ladders to replace belts, they should go on the side which was moving toward the floor. In this way, if they were struck, they would be knocked to the floor instead of being carried upward. Mr. Gormley said that he thought well of Mr. Lund's rule, but it could not be lived up to in all cases, especially when heavy belts were handled.

The second question discussed was: "What Is Your Method of Keeping Aisles Cleared?"

AISLES MARKED.—Mr. Prichett explained that at the Macey factory they have two parallel lines drawn through the factory, marking the space to be used for aisles, red lines in some instances and yellow in others. The cross aisles are marked off in the same manner. The aisles are always kept cleared and no trucks are allowed to stand in them. The method has worked excellently from an efficiency as well as a safety standpoint.

KEEPING AISLES CLEARED.—Mr. Yeomans explained the method employed in one factory to keep the aisles cleared. An aisle was made in the center of the factory and 18 inches clear was allowed around the walls. The first time a man blocked the aisles with anything he was warned, and the second time he was discharged. It proved to be an effective method. At his factory the aisles are not marked with lines, but the foremen see that aisles are cleared every night.

DRIVEWAYS CLEARED.—Mr. Ryan of the Excelsior Wrapper Company suggested that driveways should be kept clear on account of possible fires.

The third question up for discussion was: "How Do You Protect Men Unloading or Loading Cars Against Injury?"

GUARDING SWITCH TRACKS.—Mr. Ryan said that at the shop of the Excelsior Wrapper Company they have signs posted, warning the men regarding locomotives. They also forbid men riding on cars while being switched. They have a door in the boiler house which opens onto the railroad track. The noise in the factory is so great that an approaching locomotive cannot be heard. In order to prevent possible accidents, they have a swinging gate over the track which has to be pushed back by the head switchman before the locomotive can enter. Mr. Gormley suggested the use of an electric bell in this case. A discussion followed and it was decided that an electric bell would not answer the purpose.

DERAILER OR FLAG.—Mr. Sadler suggested that, when men were working in cars, they should use the standard railroad signal, a blue flag, or have a de-

railer on the track. He favored the derailer because the switchman might fail to see the flag.

The fourth question for discussion was: "What Method Do You Employ to Prevent Workmen Starting a Machine on Which Someone Is Making Repairs?"

SIGN ON THROTTLE OR SHIFT LEVER.—Mr. Ryan explained the system used in the Excelsior Wrapper Company. When a man is repairing a machine, he places a card marked "Danger, Hands Off" on the belt shaft or any other starting device, and when he is through with his repair work he removes the card. Cards are in convenient places so they may be obtained when needed. Cards are placed also on the throttle of the engine when repairs require the engine to be shut down. Although there may be one card on the throttle, each crew is expected to put up its own card and remove it when finished. The reason for this is apparent. Mr. Sadler suggested that it would be a good idea to carry this system further by having a blank space on the card where the man could put his name, the time he used it, etc. A record could then be kept in the office and men would be more careful about breakdowns necessitating repairs. Mr. Campau said that he knew of firms that used the system in connection with the cost systems. In this way they can check up the time the machine is idle, the time taken for repairs, and the cost of repairs.

CO-OPERATION WITH SAFETY COUNCIL.—Mr. Gormley suggested that the manufacturers and the members of the safety council should work more together. There would be a valuable exchange of ideas. He suggested also that the men in charge of the safety work in the factories should visit neighboring factories occasionally and see what their friends were doing in the line of safety work. It would be of great help to all.

Stereopticon slides of the International Harvester Company, showing the right and wrong ways of doing things, were thrown upon the screen and explained by Mr. Prichett.

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Demonstrate clearly to your workmen that there is no such thing as a necessary accident; the man who has an accident should have a guardian.—*C. K. Gibson.*

## WHAT SHOULD BE THE DISTANCE BETWEEN HAND RAILS ON STAIRS?

*By H. W. Mowery.*

[This is an important subject, and SAFETY ENGINEERING extends invitation to all parties interested to submit their views in the premises for discussion.]

A discussion on the maximum distance between hand rails on stairs is desirable. The Workmen's Compensation Service Bureau in its new "Universal Safety Standards for Foundry and Shop Practice" requires intermediate rails on stairs 8 feet wide and more.

It is the opinion of the writer that 7 feet 11 inches between the hand rails is too great a distance under any circumstances. It would seem that instead of determining the number of hand rails by the width of the stairs, it would be better to fix on a specific maximum distance between hand rails. What should this distance be?

I have taken the matter up with several engineers of maintenance and operation, who have large crowds to handle on public stairs, and their opinion seems to be very decidedly in favor of establishing a maximum distance between hand rails of from 26 inches to 34 inches, since these conditions show most favorable results in actual practice.

On a certain stairway in Hoboken on which the down traffic was very heavy there were several accidents, but after the installation of intermediate rails 26 inches apart, there were no accidents. Several instances of this nature could be mentioned.

A person, carrying a suitcase and a coat over either arm as he goes down stairs, should be able to grasp with the other hand a rail in case of tripping or stumbling or being bumped into by someone in a hurry. If one cannot do this, accidents are bound to happen. Richard Canfield met his death on a stairway less than 4 feet wide, because in falling he was unable to reach the hand rail for which he grabbed. Expressions of opinion on this subject are desired.

# SAFETY WORK BY RAILROADS

LACKAWANNA.—The "Safety First" movement was placed in practical operation on this company's lines on January 1, 1912. Since then no effort has been spared to interest all employes, and to impress upon them the necessity for preventing personal injuries to the patrons of the road, to their co-employes, to themselves, and to outsiders. The progressive decrease in the number of employes killed and injured, including employes in the roadway department, bridge and building department, and in the car and machine shops, is stated below by divisions and is indicative of what can be accomplished, if the co-operation of all concerned can be secured for the advancement of safety:

| Number of Employes Killed. | 1911. | 1912. | 1913. | 1914. |
|---|---|---|---|---|
| Morris & Essex division | 16 | 13 | 22 | 8 |
| Scranton division (inc. B. & P. div.) | 31 | 18 | 13 | 6 |
| Syracuse & Utica divisions | 5 | 8 | 2 | 5 |
| Buffalo division | 18 | 7 | 8 | 7 |
| Total | 70 | 46 | 45 | 26 |
| Number of Employes Injured. | 1911. | 1912. | 1913. | 1914. |
| Morris & Essex division | 768 | 720 | 646 | 590 |
| Scranton division (inc. B. & P. div.) | 856 | 877 | 726 | 606 |
| Syracuse & Utica divisions | 231 | 228 | 208 | 195 |
| Buffalo division | 464 | 493 | 512 | 484 |
| Total | 2,319 | 2,318 | 2,092 | 1,875 |

"Comparing 1914 with 1911," General Superintendent Rine remarks, "the decrease in the number of employes killed represents 63 per cent, while the number of employes injured has fallen off 19 per cent. Although these reductions in the number of casualties are gratifying, there is room for considerable improvement. We should not cease our efforts in the direction of safety, but, if anything, increase them until not a single fatality is reported throughout the year, and the number of personal injuries is still further greatly reduced."

HARRIMAN MEDAL.—On February 11, the E. H. Harriman Memorial Gold Medal for the American steam railway making the best record in accident prevention and industrial hygiene affecting the public and its own personnel during the year ending June 30, 1914, was awarded to the New York Central Railroad. The award was made to this road for its record on the New York Central & Hudson River Railroad prior to its consolidation with the Lake Shore. The medal was offered by Mrs. E. H. Harriman, to be awarded through the American Museum of Safety. The committee of award consisted of: Arthur Williams, president American Museum of Safety; Samuel O. Dunn, editor *Railway Age Gazette;* Prof. Alexander G. Humphreys, president Stevens Institute; Hon. Charles P. Neill, former United States commissioner of labor; and Hon. Edgar E. Clarke, member Interstate Commerce Commission. The medal was received on behalf of the railroad by Alfred H. Smith, president. The record of the New York Central for the year was considered remarkable in many respects. The progressive steps taken in the installation of block signals, improved roadbed, steel equipment and modern safety devices were taken into consideration, as well as the actual record of accidents. There has not been a passenger killed in a train accident on the road in four years, during which time the number of passengers actually carried on its trains equals approximately twice the entire population of the United States. Nearly 3,000,000 freight and passenger trains were operated, day and night, in all kinds of weather. The work con-

ducted by the road through its safety bureau, in educating its employes and the public in general to avoid unsafe practices, was one of the features wherein the road excelled. Substantial reductions were made in the number of accidents to trespassors and to persons on grade crossings, as well as to passengers and employes. The record as to mechanical improvements on the road showed that the entire main line from New York to Chicago is now equipped with automatic block signals and 100-pound steel rail laid on a heavy bed of rock ballast. Much work has also been accomplished in the way of eliminating dangerous curves and grade crossings, and in the substitution of steel for wooden cars. In the matter of hygiene and general sanitary measures, the road has taken advanced steps for the conservation of the health of both passengers and employes, and has adopted the most improved standards for the proper ventilation, cleaning and disinfecting of its stations, cars and shops.

EVERY-DAY CARELESSNESS.—Typical cases reported by a Canadian railroad: Brakeman kicked drawbar as coupling was about to make, foot slipped and went between knuckles; result, foot crushed so badly it had to be amputated. Another brakeman kicked drawbar to make coupling and his foot was badly injured. Track laborer attempted to get on the front of moving handcar, slipped and car run over his arm. While going to work, shopman walking on track was struck by engine. While shunting, yardman was thrown from the top of car, due to train stopping suddenly. Engineman getting off his engine at night, stepped on an obstruction alongside the track, causing severe injury. Trackman struck on foot by a pick in the hands of a fellow employe, while putting in ties. Fireman looking out of cab window for signals, while shunting; head struck box car on adjoining track which cleared the side of cab by only about four inches. Someone had failed to shove the car into clear. While enginehouse employe was walking through an opening between two cars, the cars were shoved together, catching his right arm between the couplers, crushing it. Handcar following closely behind moving train, which stopped suddenly. Handcar ran into it. Occupants of the handcar thrown off and one of them seriously injured. Fireman struck on head by lump of coal which fell from an overloaded tender. Baggage truck left too close to track which allowed it to be caught between moving engine and a small building occupied by mail clerks shoving building off foundation and otherwise damaging it. Fortunately no one was injured.

BOLTS, SPIKES, RAILS.—See to it, when breaking bolts out of angle bars, that everybody is in the clear so the end broken off will not injure anyone in its flight, says the safety inspector of a transcontinental railroad system. See that laborers, when driving spikes, keep themselves in the right position to strike accurately. Warn them to be careful not to make spikes fly, as it is dangerous for them as well as for others. When you have occasion to handle rails, to put on handcars, or a carload to load or unload, you should teach your men the "Safety First" way. Warn them to hold a rail until everyone is ready to throw it or let go of it at the same time. A foreman should explain to his men all he can about the work and how it is to be handled; keep his men familiar with his way of handling all material, and teach them to look out for one another. If they will do this there will be fewer injuries to report.

HANDCARS.—Each foreman should see that his handcar is in good order when put on the track in the morning, and he should see that all tools are so placed on the cars that they will not fall off, get under the levers, or get in the cog wheels, an officer of the Santa Fe cautions. Jacks never should be laid on the front end of a handcar when the car is going home at night. Foremen should notice all tools that are handled through the day and see that they are in good condition. Any tool that is defective, which is liable to slip and cause injury to the man

using it, should be sent in promptly to be repaired. That includes a jack that will slip or jump cogs, a clawbar that is a little wide or has a piece broken off one or both claws, a wrench that will not fit the taps, a spike maul with a round or spauled face. All these are dangerous to work with and they should be watched closely.

THE WORKMAN.—"Safety First," says R. C. Richards of the Chicago & North-Western, is not a question of dollars and cents. It is a question of saving human life, the most valuable thing in the world. Once gone, life can never be brought back. "Safety First" is trying to save men from losing their legs and their arms, which never can be put back. It is trying to save the making of widows and orphans, destitution and misery. Neither employers nor the laws can compel safety. But the workmen can, if they try.

CUMBERLAND VALLEY.—During 1914 the Cumberland Valley Railroad transported approximately eight and a quarter million tons of freight and two million passengers without the loss of life of a passenger or one of its 2,100 employes and without injuring a passenger. While there were minor accidents to employes, not so much as a finger or a toe was amputated; and with the exception of one fractured ankle, not a leg nor an arm broken. Without taking into consideration a few slight accidents on industrial sidings and in yards, there was not a wreck in the general acceptation of the term. The wreck crew was called seven times during the year, but the total cost of wrecking was insignificant.

HANDCARS IN FOGS.—A Western road had an accident recently where a handcar was struck by a train when the fog was so dense the sectionmen did not see the engine far enough away to do anything but jump, which was the proper thing to do at that stage. Commenting on the accident, the safety inspector of the road said: "All foremen know it is dangerous to run a handcar in a fog, and that it should not be done excepting in case of emergency, and then with a flagman far enough ahead for protection. Never allow a man to ride on the front end of a handcar if he is a new man. A foreman should know his men well enough to know the ones that are the safest to ride the front end of the car. Both foremen and men cannot be too careful or too watchful when they have handcars or pushcars on the track. Foremen or others should not get too careless in leaving cars on the rails, just because they can see a train each way one or more miles. Frequently a train slips up unobserved in spite of this fact.

## COMPRESSED GAS MANUFACTURERS.

Speakers prominent in accident prevention and fire prevention work addressed the Compressed Gas Manufacturers' Association at the Manhattan Club, New York, on January 18, at a dinner given by the association to the members of its retiring executive board. The association, which has 82 members, aims to improve the methods of manufacturing and equiping the cylinders and bottles in which compressed gas is transported.

Col. W. B. Dunn, chief of the Bureau of Safe Transportation of the Interstate Commerce Commission, praised the spirit of co-operation manifested by the association toward the work of his department. Dr. Hugo Lieber, president of the association, acted as toastmaster. Addresses were delivered by Dr. W. H. Tolman, director, American Museum of Safety; Robert D. Kohn and F. J. T. Stewart, of the National Fire Protection Association; Dr. R. W. Moore, of the Board of Hazardous Trades of New York City; Professor Charles E. Lucke, of Columbia University; Professor Charles Baskerville, of the College of the City of New York; Dr. Charles F. McKenna, chemical expert; Dr. H. E. Sturcke, president of the Crescent Chemical Manufacturing Company, and A. Cressy Morrison, vice-president of the International Acetylene Association.

# GAS AND ELECTRIC EMPLOYES

ASPHYXIATION IN TRENCHES.—Recently two workmen of the United Gas & Improvement Company were fatally asphyxiated and several rescuers made ill from inhaling gas in a trench. The two men were left by their foreman to finish excavating for a service connection. To avoid disturbing the paving, a tunnel was made. The main was at the end of this tunnel, and although they were not instructed to do so, the men attempted to tap it for the service connection, and gas escaped in such volume that the tunnel was quickly filled and they were overcome. Whether these men had been warned in a way that they could understand of the danger in working against gas with no one near to render assistance if needed, is a question, the employing corporation says. One could not speak English, and the other only slightly. Many accidents have occurred because men did not understand instructions given them in English, and that may have been the case here. Then again they may have known the danger and lost their lives as the result of taking a chance. The occurrence is an illustration of what is liable to occur if proper precautions are not taken by men who work around escaping gas, or where it is likely to escape.

EIGHT KINDS OF CARELESSNESS.—Carlessness may easily lead to accidents, the Grand Rapids Gas Light Company says, viz.: Disobeying instructions, careless handling of tools and materials, misplacement of floor plates in front of benches, opening mouthpieces and reaming standpipes, burns from hot tar, steam, ashes, carelessness in handling of elevators, working around coal pits, use of ladders.

ACCIDENTS WILL HAPPEN.—An arc lamp trimmer carrying an eight-foot ladder was in the act of entering a store, a public service company relates. At the same moment the proprietor pushed open the door, causing the trimmer to step backward and slip off the step. The ladder came in contact with a revolving fan over the doorway, breaking the blades. One of the blades broke a plate glass window and the other flew through the air, narrowly missing a pedestrian on the opposite side of the street.

ELECTRIC STATION MEN.—Among the provisions for the safety of the 5,000 men employed by the New York Edison Company which furnishes to a large extent light, heat and power for the City of New York, the following points should be interesting to all electric station men:

All high tension switches which control the generators are installed in separate compartments. These are carefully numbered, and the operator detailed to work in the compartment has before him a number which records the voltage. But he must be accompanied by some one who has a key to the compartment, and a great deal of formality is necessary before he is permitted to begin work.

If alterations are to be made in the connection or location of any of the high tension apparatus, or if additions are to be made to it, a sketch must be furnished the system operator 24 hours, if possible, before the work is to begin. The foreman of the electrical construction department, or the employe whom he delegates to perform the work, must ascertain from the regulator in charge of the switchboard in the station in which the work is to be done that the particular cable, bus, or switch is not connected with any source of high-potential, and that it has been discharged to ground since last it carried high tension current. The regulator must notify the system operator that the construction department is ready to proceed with the work described in the sketch.

Then, upon word from the operator, the regulator block switches and connects all conductors to ground and to each other by means of the grounding and short-circuiting device provided for the purpose. This work the foreman of the electrical construction department personally inspects. He then places a "NOT CLEAR" card on the apparatus. When the work is finished, a note of this is made in the high tension log book and the apparatus is inspected. If pronounced ready for use, the regulator notifies the system operator, and on receipt of instructions from him, removes the grounding and short-circuiting device, switch blocks, and "NOT CLEAR" cards, noting the operation in the log book. In all the work on high tension apparatus the same care is exercised. The apparatus is so protected that the men cannot remove any of it, all live parts being kept under lock and key. All cables are insulated and the greatest care is taken when they are cut.

# FACTORIES, MILLS AND WORKSHOPS

ORGANIZED SAFETY WORK.—A conference board on safety and sanitation has standardized and distributed in large quantities danger and caution signs of various inscriptions, some printed on linen for general application and others made of metal and mounted on stands for use as portable floor type signs, outdoors as well as indoors. Similarly, workmen's shoes adapted for general factory service but of particular value to foundry workers, and foundry leggings for the same purpose, have been especially manufactured for the conference board and inspected and distributed by it in large quantities throughout the country. Many managers have reported to the conference board that the use of such shoes and leggings has reduced, and in many cases practically eliminated, foot burns in their foundries. Improved safety goggles for the protection of workmen's eyes against injury from flying chips, dust from grinding wheels and other sources, splashes from molten metal and excessive glare, have been made under the direction of the conference board, and they now afford effective and comfortable protection to thousands of employes. Shaft casings, consisting of spirally wound pressboard tubes, are now available, and their use is recommended as a protection of the workmen against the danger of contact with revolving shafting.

PHYSICAL EXAMINATIONS. — Nowadays, employe and employer alike are reaping the benefits of physical examination, which is gradually being introduced despite opposition, says the Rochester Chamber of Commerce. The system readjusts the continually ailing man to work that does not so tax a weak heart that enforced rest in bed necessary for recuperation. Likewise, it takes the awkward employe, all thumbs and no deftness, from light assembling, where swiftness and accuracy are the cry, and places him with his bull heart in the heavy lifting department. No employe wishes to work at the side of one afflicted with an insidious communicable disease.

RARITAN COPPER WORKS.—Accidents in 1914 by mechanical apparatus, such as boilers, cranes, emery wheels, machinery of every description, not including locomotives, caused four injuries. Of this number two accidents were occasioned by carelessness and, therefore, were unnecessary. Such a record seems a convincing argument in proof of adequate safeguards for moving parts. Twenty-nine men were burned during the year, two by electricity; 17 by hot metal and flame; 10 by steam, hot water and acid. Of the hot metal burns three were caused by picking up hot pieces, and two through failure to wear goggles. From falls, caused by slipping and tripping, 26 men were injured, and, from ladders, two were hurt. Under the caption "Hand Labor" is where accident prevention work meets its Waterloo. Under this head the management regrets to acknowledge 160 accidents, or about 58 per cent of total injuries. One hundred and two of the injuries were caused by men dropping material on their hands, toes and other parts of the body; 17 ran into or struck their hands or parts of their body against something; 16 in using hand tools; 20 ran slivers into or cut themselves on sharp edges, and two suffered strains from lifting. Nine men stepped on protruding nails. Of all the accidents occurring in the year, these nine were without warrant, and beyond question non-preventable. The carelessness of some one, in leaving these nails protruding and in places where men must pass, is alone responsible.

MEN, NOT MACHINES, TO BLAME.—In a Detroit factory, employing 8,000 men, 10 accidents occurred last year. The managers kept a record of how each accident happened, a manufacturer's publication says, and it was found that every one

was caused by somebody's carelessness and not through the fault of the machinery. About one out of every five accidents can be prevented by safeguards, and four out of every five are due to the forgetfulness of the men, or through "taking chances." Such accidents can be prevented only as men can be made to think and act in a safe way.

USELESS FIRST AID BOXES.—You know that when an accident happens there is always a little excitement, and men don't remember things as quickly as they would, if they had more time to think, narrates the safety engineer of a Wisconsin company. It is always best to be prepared. When the man next to you receives a cut, the first thing that comes into your mind is "It must be tied up." Then you think of the First Aid Box. You have seen the inside of this box, and you know just what is in it and what the different things are for. You go to the box, and what do you find? An empty bottle that once contained a germ-killing solution. A small box that once had antiseptic cotton in it, and a few inches of adhesive tape and some bandage material—not enough for your injured friend. Somebody in the factory had beaten you to it, and taken most of the things home, a little at a time. Meanwhile, the injured man is waiting patiently (?) while someone runs to the First Aid Box on the next floor, perhaps to find it in the same condition.

MAGNET CRANES.—Cranes of any kind, and particularly magnet cranes, the Travelers' Insurance Company says, should never be stopped over a passageway unless men are stationed at each end of the passageway to warn employes. All employes should be instructed with respect to the principle underlying the action of the magnet crane, so that they will realize the special danger of standing or passing beneath the load. Even if the magnet has no load, but has the power on, a man passing close under it may be exposed to danger, if he is carrying steel or iron on his back or shoulders. If the metal comes near enough the magnet will draw it up, and the action is so quick and unexpected that the man may also be lifted, before he has time to release his hold. In any such case the first and most natural impulse of the craneman is to shut off the current; but if he does so, he immediately destroys the attractive influence of the magnet, and the steel or iron that it has seized falls back again upon the workman, very likely with serious consequences.

LET EVERYBODY HELP.—Boilermaker, guard against letting the heads of rivets fly and injure some person who may be passing. Blacksmith, protect your fellow workman from possible injury with the red hot iron or otherwise. Brother Fitter, with you rests the safety of the man near you. These appeals are made by the superintendent of a railroad in Canada. He adds: "In dismantling and assembling the locomotive there are many ways of avoiding injury—raising and lowering heavy parts, hammering, chipping and lifting—and it behooves every one of us to be on the alert and protect ourselves from injury."

OIL - SOAKED WOODWORK.—Woodwork should not be used around a crane, because it is likely to become oil-soaked, and it is then exceedingly combustible, cautions the Travelers' Insurance Company. If it should take fire the craneman would have to run the crane to the stairway in order to escape, and the motion would increase the fire and add to the craneman's danger. If he tries to leave the crane in any other way than by the regular ladder or stairway, he will be exposed to hazards of other kinds, and these will be accentuated by his haste.

CHAIN SLINGS.—They are in common use. They are flexible, and they lend themselves readily to most of the hitching operations usual to industrial requirements. Care must be taken, however, says the National Founders' Association, in the use of chain slings, inasmuch as frequent strains slowly weaken the chain by crystallization, a

condition which, though serious, is not readily visible. Weakness caused by surface wear or the slight opening of a single link is also apt to escape notice. Breakage of single links occurs oftener in cheap chains made of common iron or steel and insecurely welded; a flaw in any one link may drop the load. It is obvious, therefore, that a cheap, common chain is entirely unsuited to overhead transportation of materials. Only the very best handmade and tested wrought iron chain should be used for this purpose. The extra cost is negligible when compared with the liability of accident through breakage.

RECKLESS WORKMAN.—During an accident hazard inspection in a large plant, a man was seen removing grease by holding a piece of waste against a pulley moving at a very high rate of speed. An involuntary movement, or the air disturbance caused by the rapidly moving belt, might have caused strands of the waste to be caught between the pulley and belt, with serious and perhaps fatal results.

FIELD OF SAFETY ENDEAVOR.—Much of the field of safety endeavor is of common concern to all employers, says a conference board dealing with safety questions in large insurance establishments. Electric lighting is universally used in industrial establishments and the men whose duty requires the handling of electrical circuits need protection against this hazard. Elevators and cranes are found in practically every shop and their safe operation is equally important in all industries. Pulleys and belting and revolving machines of one kind or another, in whatever industrial enterprise employed, can and must be so guarded as to eliminate accidental injury to employes. Finally, when an employe has sustained an injury, the most effective first aid by the layman must be available and employed for his benefit, without regard to the industry in which the injured is engaged and with reference only to the nature of the injury and the quick availability of expert medical attention. A conference board, composed of men with knowledge, experience and judgment, can decide more correctly on proper methods of prevention or remedy than any of its constituent parts alone.

IMAGINARY "SAFETY FIRST."—A recent examination of a certain new shop which has been heralded as the safest of its kind in the State, says a trade paper, disclosed a contradictory condition of affairs. The shop has an employes' safety committee, which meets regularly to discuss the cause and cure of every accident, and the company apparently is willing to follow any suggestions that will reduce the hazard to its workmen. When the mill room was shown to a visitor, a great deal of pride was taken in exhibiting the sheet-iron housings and screens that had been put up to inclose the belting of some tools, yet, strange to say, other belts nearby carried no such protective devices at all. The floor was littered with boards and blocks in every possible direction, a ladder had been left in a decidedly dangerous position against the wall, and across a passageway, overhead, a loose board was bridging the space between a window sill and a roof truss ready to Zeppelin the innocent visitor. Aside from these major dangers were such minor ones as brushing off a circular saw which hung from a post with a looseness akin to nonchalance, or April-fool kicking into a pile of shavings that might cover a piece of metal with more inertia than is good for toe comfort.

SPECIFIC DEVICES.—The multitude of safeguards that are used in the various plants of the Youngstown Sheet & Tube Company precludes a detailed description of each. A few of the important devices are given in the following list: Trolley bar, replacing the trolley wire for crane runways; magnetic control of all motors on cranes, making it impossible to abuse the crane or the motors by connecting the latter directly across the line; "Youngstown Safety Limit Stop" to prevent hooks from overloading and to stop hooks within an inch of travel.

# PUBLIC SAFETY AND WELFARE

AS DANGEROUS AS DYNAMITE.—A steam-boiler with an inoperative safety valve is about as dangerous as a piece of dynamite. Wagons loaded with high explosives may be seen any day passing through the streets of crowded New York. Attention, however, is drawn to the danger by means of large red letters and a red flag hung conspicuously from the rear of the vehicle. But boilers carrying high steam pressure and having plugged safety valves exist under the sidewalks of the great city without any warning visible to the unsuspecting pedestrian. This statement may seem sensational, but it is based upon fact nevertheless, engineers of the Fidelity & Casualty Company declare.

SAFETY FOR THEATERGOERS.—Rules governing employes of Gayety theater, Montreal, in case of fire:

Stage—(1) Asbestos curtain to be dropped immediately on ring of bell or indication of fire. (2) Push button to give alarm to front of house so that fire alarm box may be rung to call fire department. (3) See that ventilators above stage are opened immediately. (4) Use fire appliances which are in theater to put out fire.

Front of house—(1) Ushers at ring of bell to open immediately all exit doors. (2) Try to help audience out and avoid panic, advising audience to keep cool and go out quietly.

TO BOYS AND GIRLS.—Do not walk on railroad bridges or tracks, says the Superintendent of Public Instruction for the State of Michigan. Do not walk around the end of lowered gates. Do not crawl under lowered gates. Do not loiter about railroad stations or cars. Do not jump on or off trains, cars or engines. Do not crawl under, between or over cars. Do not cross tracks without stopping, looking and listening to see whether a train is coming. Do not play on or around turntables. Never take chances. The safe course is always the best and it is the quickest in the long run. Be on the alert. Get the Safety Habit; practice it every minute.

EFFECT OF SMOKE ON HEALTH.—On authority it is stated that the weight of air inhaled daily by each individual is more than six times greater than the daily consumption of food. Public health bureaus have made it possible for us to secure pure food stuffs, but the problem of pure air has received scanty consideration, the Rochester Chamber of Commerce observes. These among other facts influenced the Mellon Institute of Pittsburg to make an investigation into the "Influence of Smoke on Health." The conclusions of the papers are very general and the special study of local Pittsburg conditions has been reserved for a special bulletin. Statistics, however, from Manchester, England, "a smoky town," in 1899, seemed to prove that smoke has a deleterious effect on health. Out of 11,000 Manchester men, who wanted to enlist in the army only 9 per cent were found to be physically fit for the regiments of the line, and the navy could only accept 14 per cent of the Manchester boys who wanted to join. Manchester, it is stated, is exceptionally conspicuous for its excessive death rate from phthisis, pneumonia, bronchitis and heart disease, conditions which physicians who have studied the question say are superinduced by excessive carbon particles in the air.

EXPLOSIONS OF KEROSENE LAMPS.—There is nothing actually explosive about the oil itself, whatever its grade may be, engineers of The Travelers Insurance Company point out. Explosions are due to the ignition of mixtures of oil-vapor and air, and they are more likely to occur when using a low-grade oil than when using one of a higher grade. But whether the oil be high grade or low grade, its vapor will not explode unless it is mixed with air in a suitable proportion, and fired by direct contact with a spark or a flame.

# "THE MAN ON THE JOB"

## PRIZES FOR JANUARY ARTICLES.

*First Prize. No.* 145. *R. E. Smith, Safety Inspector, Universal Portland Cement Company, Buffington, Ind.*

*Second Prize. No.* 146. *F. M. Harp, Safety Engineer, L. A. Wight & Co., General Managers, Employers' Mutual Insurance Company, Buffalo, N. Y.*

*Honorable Mention. No.* 148. *W. R. Hambury, Inspector, Casualty Department, Fidelity & Deposit Company of Maryland, Baltimore, Md.*

*Another meritorious article was contributed by E. H. Ahara, General Superintendent, Dodge Manufacturing Company, Mishawaka, Ind.*

*Comments by the members of the committee appear on page* 172.

*The names of the members of the committee to award January prizes will be found on page* 174.

*Conditions under which articles are submitted to this department are published on page* 174.

**No. 149.** CONSIDER NOTHING SO MUCH UPON EVERY OCCASION AS SAFETY.—The above is not my own quotation, neither do I remember where I heard or read it; but there is so much food for thought contained therein that I have decided to pass it on with the comments it inspired. Should we but stop to consider the factor of safety in connection with the daily tasks we are called on to perform regardless of our vocations, there is no doubt that we will all agree there is no other question of such vital importance to every one of us individually and all of us collectively. Yet how many of the millions of people in this country ever stop to consider the factor of safety in a physical sense one-hundredth part as much as they do the financial aspect of any undertaking? The percentage is small indeed, as will be corroborated by the estimated total number of accidents or so-called accidents reported to the various bodies compiling and recording these reports.

Are we the wise progressive nation we are credited with being, or, in the face of these innumerable accidents, are we a nation of narrow-minded individuals blinded by the fact that we have a word in our language that too often is used in the place of thoughtlessness, neglect, carelessness and even crime? I refer to the much abused word, ACCIDENT, which Webster defines as an "unusual happening or something unforeseen." Many of the so-called accidents reported daily to the insurance companies or to the various State Industrial Boards in charge of workmen's compensation cannot be classified as accidents in the true sense of the definition. I do not believe that more than 5 per cent. are actual accidents, for in looking over a file of reports taken from a city of a little over a half million population, I find very few I could honestly classify as accidents in the true sense of the definition. Nearly all of them could have been averted by the use of ordinary care and thoughtfulness of the safety habit as it could and should be practiced.

Accident prevention in the past few years has developed wonderfully among the larger manufacturers, railroads, street railways and municipal governments. The results obtained are even better than those expected by the most optimistic, but the large corporations, public utility companies and municipal safety organizations form such a small part of our total population that the total number of accidents, while being reduced considerably, has not shown the decrease that could be shown were more attention given the small manufacturer employing from five to 100 men.

The larger manufacturing companies

have realized that systematic accident prevention work pays handsome dividends in the shape of fewer accidents and a more efficient organization, as well as establishing a closer relation between the employer and employe. This, in this strenuous age of competition, is a very important factor in the conduct of any business; therefore, the large manufacturer is well taken care of, but the fact remains that the small manufacturer contributes more than his share to the total number of accidents, and in a great many cases it is almost impossible to secure his co-operation in making systematic accident prevention work a part of his business unless the matter is placed before him and analyzed to his satisfaction by some one familiar with the safety movement, as it is being worked out in similar plants. Safety work should be given as much, if not more, consideration by the small manufacturer as any feature of his business. It should be given as much attention in detail and must be considered in figuring profits and losses in every line of business.

Referring to safety as an investment, M. W. Mix, president of the Dodge Manufacturing Company, of Mishawaka, Ind., in his address before the National Safety Council in Chicago, hit the nail on the head when he stated: "It cannot always appear in the inventory, it may not be accounted for in the financial statement, it may not be a known basis of credit, yet in its very earning power it becomes one of the most productive elements of a business."

It is absolutely essential that the small manufacturer carry liability or workmen's compensation insurance and in rating risks for workmen's compensation insurance where the analytical schedule is used, it gives the manufacturer an opportunity of placing safety work on a dollar and cents basis; there are few successful business men that will not reduce the cost of any necessity in their business if given the opportunity.

In the small plant as in a large plant safety work has evolved into a question of education. First, in educating the employer up to the true significance of safety work and then, through him, his employes. It has been my experience that before anything else is considered there must be a sincere desire on the part of the employer to enter into this work and his sincerity must be apparent to his employes or the results will not be worth while. It would be folly to preach safety among his employes and then at times take unnecessary chances himself, it would be more folly to tack up "Safety First" signs and instructions and employ men that disregard them and it would be the height of folly to purchase safety devices and then not insist on their use. To secure results, it is absolutely necessary to make "Safety First" or safety practices the most important part of our lives whether it is on the street, in the office or shop, or at home. In the words of the quotation, "Consider nothing so much upon every occasion as safety."

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**No. 150** THE SAFETY ENGINEER AND HIS DUTY IN CONNECTION WITH ACCIDENT PREVENTION.—Statistics agree that about 90 per cent. of industrial accidents are preventable and this fact has not been disputed so far as the writer knows.

The most important question then is how best to go about the work to accomplish the desired results and reduce accidents to a minimum. This, I think, is one of great importance to manufacturers and others employing labor. Where the co-operation of owners and managers has been secured, machinery guarded and first-aid treatment is given quickly, a marked reduction of accidents and hospital cases is in evidence, which proves that this method has given good results and is undisputed proof in favor of the modern system over the old way of using unguarded machines and wrapping up wounds without cleansing and with any old rag that was handy.

Many of the larger manufacturing concerns have put in emergency hospitals with trained attendants, where all employes are requested to go if sick or hurt, and many are able to return to duty a short time after first-aid treatment. The more serious injuries are sent to a hospital or a doctor is called, and doctors agree to the great benefit derived from this system.

Proper safeguarding of machines and exposed places has helped to reduce accidents, probably, 25 per cent. In many large plants a recommendation has been made to divide the factory into departments, each to be in charge of a competent foreman, especially selected as to his fitness to properly handle the work in his department; this has brought splendid results and has reduced accidents in some plants from 40 to 50 per cent. The various foremen should meet the manager at stated intervals to talk over the progress made and matters of general interest in the safety and health of their employes. Such meetings have had very beneficial results in the matters of safety to employes and brought out many interesting things in connection with improvements that have increased the efficiency of production; also, the interests of the department foremen have been increased to such an extent that each one strove to obtain even greater results under the safer conditions of those working under them.

The appointment of a factory "Safety First" inspector for large plants is another way recommended to lessen accident frequency. This individual makes daily rounds, notes conditions in general, reports misplaced guards or new ones needed and defective equipment wherever found, also any carelessness observed on the part of employes; he reports directly to the foreman in charge, with a copy to the manager, who takes such action as seems best to meet the case. It is plain to see that by such a method the manager can locate the cause of accidents and with his advice the proper steps are taken to eliminate the trouble, always bettering the general conditions of his plant. While the insurance safety engineer finds many of these things on his periodical visits, the local "Safety First" man is The Man On The Job going over the factory daily.

Enforcement of factory rules is another important matter in connection with "Safety First" work and must not be overlooked. The posting of rules and allowing them to be disregarded shows very poor management. Once a rule is posted, every employe should be obliged to obey it or be called to the superintendent's office and asked if he thoroughly understood the order; if not, be instructed and given a copy to keep and read it; no excuses should be accepted afterwards. A disregard for rules should be considered a great offense against the management and dealt with seriously in order to have the desired effect upon all interested. The posting of attractive signs at points of danger and in conspicuous places has given excellent results. These silent reminders have caused employes to stop and think because the eye had caught the warning at the time when the mind was lost in thought; thus an accident was prevented. I believe that bulletin orders and signs should be changed from time to time in order to get good results from this source. One becomes used in time to conditions encountered daily and thus pass them by, but something new in color or design at once excites men's natural curiosity, causing the employe to think; and once a man stops to think he becomes a safer and better man in all his undertakings.

Employes should be given the encouragement of the employer for being prompt and efficient in their work. This can be done by a slip in pay envelope, an open letter or by a short talk at a chosen time by one in authority and it will be found that by coming into closer touch with the employe your interests and theirs will be greatly benefited and a better feeling exist. I am convinced that the majority of employers have not given this subject due consideration. There is nothing like a heart-to-heart talk with the other fellow in promoting the general welfare of those depending on you for sustenance and who are less capable of judging many conditions that tend to raise the moral and physical hazard of a large manufacturing plant and its employes until it will stand out distinctly in a class by itself. I believe that carelessness on the part of employes and lack of time and attention to study general conditions by the employer, in a plant, in reference to the subject of welfare and accident prevention, are both to blame for many bad experiences that have come in some instances to the writer's notice; and all will agree that it is time to cut the needless number of accidents to the least possible limit. Humanity demands this

of all who labor and all who employ labor.

A few years ago the general impression among managers and superintendents was, that the inspector had to complain of certain conditions in order to hold his job. Nothing was further from the truth. That man had seen conditions under which men were injured and being a mechanic himself needed no argument to convince him that it was money well spent to make a dangerous machine or place safe, and he took to the assured this information free. One who has seen the changes that have already taken place along the lines of accident prevention is very much encouraged.

The safety engineer is still in the field pushing the good work along. Many articles have been written and much literature has been published and distributed by practical men until the "Safety First" signs can be read from the car window as one is being whirled along at 40 miles an hour. It is in the air: it is not a fad; it is a fact and the man who does not accept facts is behind the times. Get in line and help the cause along. There is still much work to be done. Appoint a "Safety First" man in each department of your factory or as many as are needed and watch the results.

When the year's experience is tabulated and laid upon your table, you will find the item relating to accidents has been greatly reduced, thus saving the necessary time of caring for the injured and the loss of time of a valuable employe. It will need no argument to convince you that it pays in dollars and cents to carry on a work of "Safety First" in every department throughout your plant.

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**No. 151** COMMON SOURCE OF PERIL AND ITS REMEDY.—One of the commonest forms of work in an industrial plant, wherein men needlessly expose themselves to injury, is crane, chain and block work. I refer, in particular, to the possibility of a break in some part of the lifting mechanism or to the slipping of the chain hold while the workman may be underneath the load.

This danger is ever lurking in a machine shop, where the hoists must be regularly employed to move and place heavy castings and weights. In doing this replacing, the workman so often takes his position that, in case of a broken chain or slip in the hold, a crushed foot, a broken ankle or mashed fingers must result.

Cheap help is not alone in taking these risks. Skilled machinists, in my experience, are daily observed to be careless in this respect, so much so that it is provoking and discouraging to one vitally interested in safety. The cheap man may not know: the skilled man knows, but often he takes the risk, nevertheless.

An injury resulting from this cause is all the more to be deplored since it is wholly preventable. Safety devices, applicable to work of this nature, cannot be designed. Safety notices can be posted, but they will do little in the elimination of this particular danger. A man may be "bawled out," but the effect will be felt only as long as the foreman is at hand.

What, then, is the remedy? My remedy is personal education. By this, I mean the personal appeal to every man seen taking these chances. I have found that the permanent remedy is to stop and talk it over. Show him that getting under the weight is wholly unnecessary. Show him that a steadying hand-hold is all that is required. Also, emphasize the proper method of handling the load while it is being moved along the track by the crane. He should walk free of the load. No personal injury can then result. Explain to him that, in placing the job on the machine, his arms and hands should be used as guides and not as supports. Careful application of these ideas will eliminate nearly all the danger.

Try this remedy and you will be astonished at the appreciation shown and the interest taken in safety. The men can tell you are taking a personal interest in their work and they, themselves, will in turn pass the suggestions along.

In response to such suggestions as these, I have had men reply, "You're right," "That's so," "I hadn't thought of that," "Thank you." Men do not

make such replies unless some fact is driven home in a spirit of good-will.

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**No. 152** SAFEGUARDING A PLANT.—Machinery in use in textile plants is generally of a hazardous type, and the majority of mills have been run for a number of years without any attempt to lessen the unsafe condition of their machinery, except in a half-hearted way, boxing a few belts and placing tin or wooden guards that no conscientious inspector could tolerate, and, when any remark was made regarding these guards, the question would be fired like a shot from a cannon: "Aint the gears guarded?" And, of course, one had to admit they were guarded, but——. No appeal to their better judgment overcame the fact that they had made a guard for the gear or whatever else it might be. This was sufficient to cover the law, and, if you did not like it, you could cancel your policy. But these make-shift guards will soon be a thing of the past, thanks to the W. C. S. B. Its work in standardizing guards has done more in one year than appeals from inspectors have done previously in five years.

At the time of writing there is every prospect of a workmen's compensation act being passed in the State of Pennsylvania. There will then be a mad rush for standard safeguards. Under old liability laws, safeguards were put up only under compulsion from the insurance companies. They were of no benefit to the manufacturer, but they tended to lessen the hazard to the employe. Under workmen's compensation laws, safeguards will be installed as a matter of dollars and cents; the more safeguards, the less premiums. When safeguards mean reduced premiums, they will be installed promptly and efficiently. No make-shifts then, no sirree. "Let us know what you consider standard, Mr. Inspector, and we will have it on tomorrow."

The writer has in mind a risk in a New Jersey town. This concern was a new business, started by three or four men who had been employes previous to the venture. In due time I made the inspection for classification and merit rating. The plant was in very fair condition physically, but I recommended several guards in places they had never expected required guarding. The recommendations were complied with and this was the result: Some three months after the rating inspection I called at the plant and was at once asked if I wanted to "look around and find some more places to guard." (This is a true story.) The explanation was that the reduction in their premiums was such that in two years the difference would pay for the guards, and they were a permanent equipment. This is what workmen's compensation will do, and the majority of plants will then be put in a fairly safe condition.

Of course, there will always be the plant where they say: "There is our plant. If you do not like it, cancel your policy." It is surprising the number of places assuming this attitude. No appeal to their sense of fair play, justice, humanity, or any other generous attribute will avail. They apparently consider they are above the law, and they defy the insurance companies to do their worst. These are the concerns that will find out that the worst will be the covering by their own insurance. One accident will cost them so much that they will come around and beg for insurance.

That recalls another instance. A rug manufacturer was in business for forty years. He never had an accident, and decided he would not carry accident insurance. This continued for a few years. One winter's morning the plant started, as usual at 7 a. m., and at 7:20 a can dryer burst, with the results that a young man, running the dryer, had his head badly cut and was also badly scalded: about 300 windows were blown out of the building and some of the sashes with them. He had to send for several glaziers and carpenters to repair the damage at once as he was only a tenant in the building, and he occupied part of one floor. The other tenants required the windows replaced at once, as, owing to the weather conditions, their employes would not remain at their work. The accident cost him some $2,000.

The man is a good, charitable, Chris-

tian man, and he saw that everything possible was done for the injured youth, and the fact that an accident had occurred in his plant preyed so on his mind that he was sick for nearly a year. He then reinsured his help and later built a small mill for himself. The company I represent insured this new plant and I made an inspection in due course. I found one or two minor defects which I called to his attention after going over the plant under the direction of his son. He got hot under the collar and said he would not do anything of the kind. If I did not like the plant as it stood, I could cancel the policy—the old gag "cancel the policy." He was busy at the time, packing, and I waited until I could gain his entire attention, without disturbing his business. When he was through, I said: "Mr. B, you did not talk like that when the can dryer exploded. Now I know that you are a good, Christian man and that you are possibly excited over some other matter, but I know that you would do anything to prevent a possible accident, and I wish to show you the place I think should be guarded and explain my reasons."

He asked what I knew about the can dryer and I answered that I had visited his plant shortly after the accident, and found him sick of the worry of it and deploring the fact that the first accident had occurred after forty years of business. He softened at once and said: "Yes, I am still sick when I think of that, but I do not remember having seen you before." I recalled some remarks that were passed and he then remembered me and said: "Well, let's look at the place you want guarded." I explained the dangers of the place when we reached it and he said: "Yes, I do think that ought to be guarded." Calling his carpenter, who was working some few yards away, he ordered him to do whatever I required. This was one instance of "cancel the policy" that failed, and I believe that this man would now do anything I asked him to do, without any comments.

These experiences are daily occurrences to all insurance inspectors, and unless a man has had a good training in reading human nature he cannot retain his job as an inspector. Insolence you get in plenty, and the only thing to do when a man is insolent is to leave his place at once. You must not argue. To do so brings you at once to the other fellow's level, and you both say things that should not be said, with the result that the insured considers he has been insulted, writes his broker, who sends a letter to headquarters, and the poor inspector gets "canned" for his lack of tact. Don't argue and don't worry. If the insured wants to argue, agree with him, if you cannot run away, but if you argue you insult him or else he insults you, and then trouble begins.

If I find an insured employer is on the warpath, and begins to talk through his hat, I wait until he pauses and then say: "By the way, that reminds me" and I tell him a funny story—and you should see the look on some of their faces when I get started. They don't know how to take it, but, if the story has a good point, they smile when it is finished, and when you have a man smiling you have him hard and fast, where you want him. This does not go with everyone. You have to know your man; then do the right thing. Make him laugh or leave his plant. Some will relish a sad story, with a moral in dollars and cents. This is also a good chaser, to use with some men, but you have to know your man first. Work on his emotions; don't let him get too far with his end of the story until he works himself into a passion; break it up before he reaches that point and you have got him sure.

There is no doubt that a great deal of the old style of inspection will be done away with under workmen's compensation. It will then be safety engineering work, and the point to be gained is to prove to the insured that great reductions can be made in his premiums by complying with the standards specified. Explain the book of standards to him. If he makes any kick, you just report the fact. Give a fair and impartial report on the condition of his plant and leave headquarters do the rest. If the plant is hazardous, and he does not appear willing to improve it, the premium he pays will be correspondingly increased. This

matter, of course, is undertaken by the W. C. S. B., which is entirely impartial, making the rates according to the physical condition reported. Any plant that shows a desire to use the old methods of defiance will find that it cannot do business that way. It must get right down to brass tacks and do what is required or pay for it, and, when you touch a man's pocketbook, he is going to find out some way to alter the conditions. When the mere fact of safeguarding his plant is reported to him as the only alternative, he will begin to think with his head in both hands and fall into line and put his plant into such shape that it will be at least fairly safe, and that is the main point—to protect the man on the job.

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**No. 153** PARAMOUNT MEANS FOR PREVENTING ACCIDENTS.—One of the best methods of eradicating accidents to employes in industry is to get the right man, who is to have supervision over the safety work. It is advisable to have a man who is well liked by all employes in the plant, one who has worked his way up from the bottom to a more important position. The mistake of most employers of labor, where their safety departments have not shown results, is that they have not the right kind of safety men.

It is a well known fact that a great many safety men are the heads of the concern or men who have never worked a day in the shop, therefore they do not know how to reach the men to obtain results. Employes in industry are skeptical, to a great extent, when the matter of using safeguards is brought to their notice. In most cases the employe will think that the employer and not himself will be benefited by the installation of a certain safeguard.

Meetings where figures and statistics are used to try to educate the workmen will not give results, as such are like Greek to the average employe. The proper way to prevent accidents is to have a meeting after a certain accident has occured and discuss same with the men. They, being familiar with the cause and the misery it has given to one of their number, will be in position to offer suggestions to prevent a similar occurrence. At these meetings the men's attention should be called to the fact that, unless they use precaution, one of them may be the next to be injured or killed.

Meetings should also be held where only the employes attend, to discuss means of safeguarding the plant. Better results will be had at such meetings, as most men are too timid to get up and make suggestion where their foreman or superintendent is present, being afraid that if they may make some suggestion, it will cause them to lose their jobs. This sort of work is real co-operation, and one that is bound to give results.

By having a man, as safety inspector, who has worked his way up from the bottom, and with whom all the men in the plant are acquainted, the men will be more inclined to listen to what he has to say and carry out any suggestions that he may offer to safeguard all concerned.

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**No. 154** GETTING YOUR MAN.—When we took up the work of "Safety First" in our plant, employing about 400 persons, including those in the office and shipping departments, we realized, as most small manufacturing plants have, the necessity of educating our people to think "Safety" and act carefully. As the number of hazardous occupations is comparatively small, and what little dangerous equipment we have is fully guarded, we came to the conclusion that in order to reduce to the lowest possible minimum the number of accidents, it would be a proposition of education almost entirely.

To that end, we arranged for a big meeting of all of our employes, showed several reels of motion pictures, and listened to two of the most prominent "Safety First" men in the State—Victor T. Noonan, of the Rochester Railway & Light Company, and John Robertson, of the Eastman Kodak Company. This meeting was advertised extensively, but only a handful of our people came out to the meeting. As one of our employes put it, "This safety stuff is all bull.

They're just trying to get more out of us for nothing."

This, of course, was somewhat discouraging, but we kept at it; installed bulletin boards on the different floors, distributed "Safety First" literature and started committee work. We got the chap who made the above statement on one of our committees, and now he is one of the biggest boosters we have in this "safety stuff." We maintain a flourishing suggestion system, and, of the 113 suggestions handed in since November 1, 5 per cent pertained to safety and the safeguarding of machinery. That fellow handed in about 20 of the suggestions.

Our committees are changed bi-monthly, and within a year almost all of our male employes will have served on committees. We have cut down the number of our accidents 70 per cent in the past six months, and our slogan now is, "An Accidentless Plant."

Get down on the level with the other fellow. Be enthusiastic in your cause, show him you are interested in his personal welfare, and you'll get your proposition over every time and, moreover, "get your man."

## COMMENTS BY MEMBERS OF THE COMMITTEE.

The writer of No. 145 has become imbued with the "Safety First" spirit and has gone about the application of it in a systematic manner by requiring the employes to possess a knowledge of certain rules for safety. Their study of rules and their subjection to a quiz on application for a safety button drive home the proper conception of safety precautions. Many accidents result by reason of lack of knowledge of certain dangers, but when the workman has mastered the safety rules he is ever conscious of their violation by himself or his co-workers.

My vote is in favor of article No. 145, which gives a practical suggestion for the education of workmen in the prevention of accidents. Too many firms neglect the preliminary advice to new men which is so admirably and tersely conveyed in the form of question and answer. Persistent application of this plan is bound to bring good results.

Article No. 148 is very good. It describes modestly the very sincere efforts put forth by modern inspectors in an endeavor to avoid useless suffering through avoidable injury. To induce employers to provide safeguards, in most cases, is not a pleasant, and by no means easy, task, but when shown how simply it can be done without interfering with product or labor, no more ardent "boosters" of "Safety First" could be desired. Conversion to the principles is permanent, too.

The writer of No. 146 should have first prize, as I am of the similar opinion. The first safety commandment is: "Think." The men a little higher up that think have the employe and others thinking. No doubt, if all would think a little more, the number of accidents would be reduced greatly.

I was very much impressed by No. 145, and I think it is one of the best ideas that have been advanced for the prevention of accidents. It surely ought to appeal to Mr. Almighty Dollar, as results obtained would well repay the cost of printing the questions and answers.

My vote goes for No. 146. If every workman in the world would "think," 99 per cent. of "Safety First" would be completed. All the guards in the world are useless, if a man doesn't "think."

I cast my vote for No. 147, for the simple reason that it relates to the "howness" and not the "whyness" of

safety. We are no longer interested in justifying "Safety First" principles. When the writer sees such articles in regard to the advantages of safety work he passes them up.

The writer of No. 146 says: "Think." This one action—business of thinking—is the prime factor of safety. The writer receives my vote for first prize.

I cast my vote for No. 145 as the winner of the first prize. The questions and answers are very good, and a re-reading of them will refresh the memory, and that is more or less needed by all safety promoters. For those who are not familiar with the questions the article ought to prove interesting and profitable.

I cast my vote for No. 147, as I feel that he has started the right foundation to get at the causes of the accidents, and therefore will be able to eliminate the greater part of them.

A large percentage of industrial accidents are due to the carelessness of the workmen. No one has ever pointed out to them the dangerous features of their business, and many of them are ignorant of how to act safely, either for their own sake or for that of their fellow-workmen. The system put forth by the writer of No. 145 would act on all workmen in the same way as strict examination has caused the railroad men to respect the red light.

In voting for No. 145 for first prize, I firmly believe that if employes were required to show a perfect knowledge of, and compliance with, the catechism, as laid down by him, preventable accidents would be materially reduced.

The writer of No. 146 understands plainly the danger of the thoughtless and careless workman. Carelessness is undoubtedly the cause of the great majority of accidents. The campaign for safety education through organization is of little value to the workman who does not think about what he has been told and put it to practical use for the protection of himself.

I consider No. 145 the best, for the reason that the list of rules submitted is one of the best I have seen, and it covers so many phases of accident prevention that it is well worthy of being copied by other firms, that are practicing "Safety First" without rules. No. 147 is well worthy of second prize, for the good results shown by the statistics given, and the writer is of the opinion that this competitor missed a very good chance in not giving a detailed account of how the results shown were obtained, and he hopes to have a vote on the subject at a later date. Go to it, No. 147, and give somebody else a chance to equal the good showing your methods have produced.

I choose No. 146 for first prize, for the following reason: He strikes the keynote of "Safety First" when he says, "Think." We, who have had experience with obstinate superintendent and foreman when making inspections, know how true his thought is.

I believe that No. 145 should have first prize. The set of questions and answers gets at the bottom of the situation. There is one thing pertaining to the "Safety First" movement that has not been mentioned in any article, as far as I can recall at this time. In delivering talks before shopmen and different organizations I have tried to get the employer and the employe to understand that the following should not be said to an inspector or anyone else. About the first thing that the superintendent will say to an inspector, when he comes into a plant and mentions a place that needs guarding, is that there will be no guard needed there "because no one ever goes there but Bill,

and Bill knows that it is there." Nine cases out of ten Bill and those like him are either killed or seriously injured at the unguarded point. This was brought to the attention of the writer in Indiana a few months ago, when three employes were killed on a basement line shaft where inspectors had tried for several years to get the owner to comply with the recommendations as to guarding.

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The thing we hire is a man's capacity to think. It doesn't make any difference, if he is digging a ditch. His capacity to think in that direction governs how many shovelsful of dirt he will throw in a given number of hours. His thinking ability is supposed to be applied only to the work in hand. When it gets beyond that point in a given job and becomes an asset to his employer, he goes up to a better and a bigger job. There are two forces at work in this world—those who think right and those who think wrong. When all men think right then wrong will disappear. Therefore my vote goes to him who advocates the policy of right thinking. He is on the right road. No. 146 gets my vote.

## MEMBERS OF COMMITTEE OF AWARD.

L. A. Beagle, F. A. Bowles, H. L. Brownell, P. S. Case, E. T. Cowart, E. M. Coyle, H. C. Ebeling, Harry J. Goas, W. J. Grebe, Walter Greenwood, Gustav H. Guenther.

J. D. Hackett, Thomas B. Howe, William Kahn, Henry Klussmann, John H. Korner, Ira Lockney, George E. Lucas.

H. H. Matthieson, R. S. McGee, J. W. Paul, D. W. Perry, L. A. Phelps, J. D. Rice, L. B. Richards, R. W. Robinson.

W. C. Sampson, J. E. Saunders, M. Seller, William H. Shea, Charles E. Slyke, George Smail, William P. Strickland, Howard Tilson, Frank H. Trego, O. N. Wampler, Dana Webster, R. J. White, C. S. Whitney, R. G. Wilcox, H. E. Wiswell.

*Cities Represented:*

Amherst, N. S.: Baltimore, Md.; Boston, Mass.; Buffalo, N. Y.; Chicago, Ill.; Cleveland, Ohio; Denver, Colo.; Des Moines, Ia.; Everett, Mass.; Floral Park, N. Y.; Germantown, Pa.; Hartford, Conn.

Indiana Harbor, Ind.; Indianapolis, Ind.; Long Island City, N. Y.; Los Angeles, Cal.; New York, N. Y.; Niagara Falls, N. Y.; Peoria, Ill.; Pittsburgh, Pa.; Pueblo, Colo.

St. Louis, Mo.; Sheboygan, Wis.; Tacoma, Wash.; Waukesha, Wis.; Wausau, Wis.; Webb City, Mo.; West Hoboken, N. J.; West Orange, N. J.; Youngstown, Ohio.

*Corporations, Firms and Departments Represented:*

Aetna Life Insurance Company, American Smelting & Refining Company, American Steel Foundries, Avery Company, Canadian Car & Foundry Company, Limited, Carnegie Steel Company, Chicago Surface Lines, Cleveland Railway Company, Commonwealth Edison Company.

Employers' Liability Assurance Corporation, Limited, Employers' Mutual Liability Insurance Company, General Accident, Fire & Life Assurance Corporation, Guardian Casualty & Guaranty Company, Hartford Accident & Indemnity Company.

Inland Steel Company, Maryland Casualty Company, New Jersey State Labor Department, New York & Queens Electric Light & Power Company, Ocean Accident & Guarantee Corporation.

Pittsburgh Bureau of Mines, Prudential Casualty Company, Southern Surety Company, Standard Accident Insurance Company, Stonehouse Steel Sign Company.

Union Carbide Company, United States Casualty Company, United States Fidelity & Guaranty Company, Wisconsin Industrial Commission, Workmen's Compensation Service Bureau, Zurich Insurance Company.

*SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The prizes are awarded for articles describing or explaining Practices, Methods of Management or Operation, Regulations, Systems, Recommendations, Suggestions, Ideas, Safeguards, Safety Devices, or Apparatus. The Committee of Award will be influenced, in each case, by the evidence which the article gives of its writer's knowledge of and interest in accident prevention in general, as well as by the practicability and range of the concrete suggestions made and, in cases where these suggestions are peculiar to some particular industry, the understanding shown of the hazards of that industry.*

*The merits of all articles will be passed upon by a Committee composed of Safety Engineers, Managers, Superintendents of Plants and Workmen.*

*Drawings, sketches and photographs are invited whenever they will aid or supplement the descriptions in articles.*

*Contributors are requested to be as concise as possible. The competition is open to everybody competent to write on the subject without the requirement of a consideration of any kind for the privilege of competing.*

*Blanks upon which to submit articles will be furnished on application, but any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

I agree with No. 145 that education first, last and all the time will accomplish wonders. The motion picture method, pictures on bulletin boards and the book of rules will work wonders in preventing accidents, and I assure you that in plants where this is carried out the inspector finds his work welcomed and his improvements carried out cheerfully.

After reading No. 148 I think it is most important and that the subject should be taken into consideration by inspectors. The keynote of success is the enthusiasm of the inspector. I vote for No. 148.

I have selected No. 148 because the man is striving to interest employers in the guarding of buildings, which is something that is getting a pretty black eye. I am a firm believer in education and an organized effort by the employes for the reduction of accidents, expense and suffering, but I am of the opinion that the greatest reduction in loss of limb and the crippling and maiming of employes can be done by guards properly made (100 per cent foolproof). I grant that the greatest number of accidents can be prevented by other means, but the most serious ones, those leaving the most serious results, are preventable by well-made guards. Article No. 145 is very good, but I do not consider it is so practical as what I believe the author of No. 148 is getting at. I feel that No. 145 will get the prize, as he is the nearest, I think, to what is now the popular idea, but I cannot conscientiously give it my vote.

My vote is cast for No. 145. If all of the rules in a good book of safety rules, as they apply to everyone, were obeyed, accidents would be almost impossible. Learning the safety rules is purely a matter of education and the common method of determining a student's proficiency is by examination. While it is the duty of a management to place a book of safety rules in the hands of each employe, it also is the duty of the employes to study the rules and make sure they understand every one that might apply to their employment; yet there must be some in large plants that, through indifference, would not try to, or for reason could not, learn or understand them, as, for instance, inability to read or because the book was not supplied in the language they could read. In any case it is necessary to make sure the employe will not be the cause or victim of an accident through ignorance of safety rules. The law requires this, and compliance with the law strengthens the defense very much in case of a controversy over who was at fault.

No. 146 has "struck the nail on the head." I agree that if we could get all workmen, and in fact all people, to "think first" the doctrine of "Safety First" would be realized, and accidents, industrial and in our everyday walk of life, would be cut fifty per cent. Truly, if the command "Think" should not be made the first commandment, it should be added to the other ten and made the eleventh. It is the keynote of accident prevention.

The self evident practicability of No. 145 appeals to me and, therefore, receives my vote, as being the best article for January. I can readily agree with the writer of the article in his remarks concerning pictures. Their language is universal and can be understood by all persons and thus their lessons can be impressed on a great variety of employes and employers.

I consider No. 145 the best; first, because the writer takes the most comprehensive view of the subject of industrial safety, and, second, because of the practical value of the contents of his "Book of Rules."

My choice is No. 146. What vast numbers of accidents have been caused by momentary neglect or thoughtlessness! If a person had taken just a moment to think, how much suffering

could have been avoided! On the other hand, what has brought the "Safety First" movement up to the standard which it has attained? Thinking men, men who are alive to the question, and are continually "on the job," can, by their example, imbue those with whom they come in contact with the same spirit, and safety will predominate over all other considerations.

The writer of No. 145, in my opinion, is entitled to first prize; not so much for the reason that his article shows ways and means, but because the questions and replies cover the field thoroughly. The questions and answers in book or pamphlet form should be in the hands of every employer. No. 145 is entitled to honorable mention.

No. 147 is my choice for first prize. The article proves the value of statistics in accident prevention. It also shows the men the causes of the different accidents and teaches them to avoid a repetition of same.

First prize should be awarded to No. 146. The most important thing in accident prevention work is the "think habit" among the men on the job.

The writer of No. 146 brings out the "key." "Think." Scientific right thinking is the only perfect safety guard known. Think right, act right.

## CASUALTY COURSES.

The casualty courses of the Insurance Institute of America for 1914-15 consist of a course on accident and health insurance, designed to cover one year's study, and a course on liability and compensation insurance. There are references also for work in steam boiler and flywheel insurance, corporate suretyship and title insurance.

The course on liability and compensation insurance covers common law and statutory liability and the liability imposed by workmen's compensation acts. It is divided into three parts—first year, second year and third year. Although the courses constitute a connected whole, the work of each year was arranged so that it might be independent of the work of the other two years. The course on liability and compensation insurance is based on a pamphlet, issued by the institute, entitled "Liability and Compensation Lectures." It consists of a series of lectures before the institute in the winter of 1913 and, with references, covers the whole field of liability and compensation insurance. The object of the third-year course is to provide an outline for the study of workmen's compensation and the problems attending administration.

## COURSE ON INDUSTRIAL ENGINEERING.

Senior students in Sibley College next fall are to have the option of a course on "Industrial Engineering." The intention is to provide definite instruction for men who wish to take up the commercial features of engineering and manufacturing industries. If undergraduates elect to take the course, they must take the first three years of the curriculum, and have received credit for industrial history and political science. The subjects in the course are: Power Engineering, Mechanical Laboratory, Electrical Engineering, Industrial Engineering, Industrial Designing, Safety and Fire Protection. The degree of M. E. is to be awarded for the completion of the new option.

## TOOTHACHE POWDER EXPLODES.

Anton Yucker and his wife and daughter, of Philadelphia, were sent to a hospital seriously burned as the result of one dose of toothache powder. Viola, the daughter, complained of an aching molar and her mother found a powder remedy which had been purchased in Austria ten years ago. As the powder was being heated some fell on the stove, causing an explosion which wrecked the room. Physicians at the hospital said the remedy contained nitroglycerine.

# "THE FIGHT AGAINST FIRE"

## PRIZES FOR JANUARY ARTICLES.

*First Prize. No. 36. C. W. McKeehen, Secretary, State Fire Marshal, Oklahoma City, Okla.*

*Second Prize. No. 38. Dr. Henry C. Campbell, Assistant Engineer, Universal Portland Cement Company, Chicago, Ill.*

*Honorable Mention. No. 37. Richard H. Borden, Jr., Fireman, New York Fire Department, Engine Company No. 4, New York City.*

*Other meritorious articles were contributed by R. P. Irving, Electrician, Taunton, Mass., and V. Ross Nicodemus, Henrietta, Pa.*

*Comments by the members of the committee appear on page* 183.

*Conditions under which articles are submitted to this department are published on page* 183.

**No. 41** FIRE-FIGHTING APPARATUS FOR THE HOME.—Living in the country, far from a city fire department, I always had a horror of fire until a happy thought struck me one day, and I immediately proceeded to carry out my idea. The feeling of security since then has well repaid me for the small outlay.

I had a plumber exchange our ordinary kitchen faucets for others having *threads* at the bottom, to which a hose may be attached. In case of fire inside the house, the hose is quickly and easily screwed to the faucet and a stream of water thrown to any part of the interior of the house; upstairs or down.

Unless of incendiary origin, a fire always originates from the inside of the house when it is set apart from others, as suburban and country homes are. This cheap and effective method of getting at the seat of the trouble by the simple exchange of faucets has given me a feeling of security that I would not be without for many times the price invested.

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**No. 42** PREVENTING "DEFECTIVE FLUE" FIRES.—How often we read in glaring headlines, "Fire Caused From Defective Flue!" This frequent cause of fire could be eliminated, if every property owner would see to it that his chimneys have an extra coat of plaster on the inside.

Often in the attic under the roof, a small piece of mortar between the bricks will crumble and fall, leaving a tiny opening through which the deadly spark falls. A smooth coating of plaster all over the inside surface of the chimney would make it practically impossible for sparks to escape and thus greatly lessen the chance for fires in the home.

One certain contractor, when building chimneys, insists that the outside of each chimney be covered with heavy asbestos. Then in case the mortar should crumble and fall, sparks could do no harm.

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**No. 43** LESSENING OF FIRES BY EDUCATION.—The large majority of fires are due to carelessness. Fires from the kitchen, factory, store, warehouse, hotel or hospital can usually be traced to this cause. Matches and lighted cigars thrown away carelessly, the improper location of gasoline, the heedless handling of gas, uncleaned chimneys or the unnecessary collection of combustible material are only a few of the many causes that spell thoughtlessness and carelessness.

Since this is the case, why not educate the public to be always careful? Train them to think first of safety. Develop in them the quality of caution. Let "Be Careful" be the slogan.

Take a specific example, a factory, for instance, and imagine the "Be Careful"

spirit well developed throughout the plant. Dust would not be allowed to collect; stock would be stored discreetly; unused spaces that invite fires would be attended to and everything would work toward reducing the fire hazard. This spirit would defy and meet the "Fire Demon" in all his attacks. Extend this to include the public and results would be universal. This is the spirit we should try to create in our population.

The public's outlook is often wrong. For example, a building is erected. In appearance it is beautiful, in construction it is strong, but from a fire protection standpoint it is inadequate. Why? Simply because the building with beauty and strength appeals to the public, while the other does not. The peoples' idea of fire prevention lies dormant. Only a small percentage of destroyed buildings is due to collapsing compared with the number that is the result of fire. Yet the people fail to see or realize this. They have the right kind of outlook when they demand a building of beauty and strength. Why not the same attitude toward fire prevention?

As soon as the public is educated to the necessity of fire prevention, then the fire-resistive building will appeal to them. Since the fire-resistive building will appeal to them, the owners will build to suit the public demands. Public opinion will then be more in sympathy with the aims of the insurance companies to enforce their building code. There is no doubt that the education of the public from a fire-protection viewpoint will result in a better building standard.

Some rightly claim we are up against an impregnable difficulty in changing the peoples' views, because our natural resources are so unlimited that they do not realize the significance of the enormous fire waste. Granted. Nevertheless, the difficulty *must* be overcome. The "Safety First" movement has succeeded in changing the public views, as statistics will soon show if they have not already shown it. Why not the fire prevention movement? Working on such a broad and deep foundation we cannot expect results immediately. They must be gradual. But when results begin to show, they will be positive, definite and lasting.

Conceding that education of the public is vitally necessary for the cutting down of the fire waste, we must now look into the question from constructive viewpoint and see what may be done practically to lessen fires. Space forbids a detailed account of every remedy that might be tried out, therefore only the most important features are to be discussed.

An effective method has been used in Illinois where the fire marshal presided and inspectors were appointed to carry out his work. These inspectors co-operated with the mayor and city council of the city to be inspected and made it their business to see that a day was set apart for inspection and public notice given. In the evening of the same day a meeting was held at which the mayor presided, and an address was given by the fire inspector. This method showed good results as reports and remedies were freely discussed with the public. Extending meetings to the people through the co-operation of municipal corporations will arouse interest and thus educate the public.

A great deal might be accomplished by personal contact with people. A fire specialist might call on a farmer and talk in a common sense and non-technical way about the protection of the farm. He might talk to the factory owner from his standpoint. He might speak to the householder from a domestic point of view. He might give school children a lecture on the appalling magnitude of fire wastes. He might do a great service which at first may seem unsuccessful, but which would inevitably show good results. This idea of getting down to the average man with plain talk and simple facts will undoubtedly do its part in the education of the public.

Circulars, technical talks in magazines and newspapers are valuable aids for operators, plant managers, etc. The reading public can be reached the most readily in this manner.

Motion pictures should be a success, as they not only give a vivid view of actual conditions, but also are an inducement to attend lectures. This method should reach a large portion of the public.

We must also look to the coming generation to carry out this great work of fire prevention. When the young mind is cautioned, it is instilled there for good and the place to reach the young mind is in the schools. Through co-operation with the teachers, arrangements should be made to train pupils to recognize fire dangers.

There are many methods to reach the public. Different people have different temperaments, consequently one method would not reach all classes. We must fight the battle from all sides and give the "Fire Demon" no avenues of escape. By keeping the one motive in view, namely, *the education of the public,* and giving our service to everything that strives to this end, we are laying deep, broad and sound the foundation of an undertaking that should be a great influence toward the lessening of fire waste.

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**No. 44** A Costly Bad Example.—I have frequently noted that in workrooms well posted with signs of "No Smoking" and of like nature, the officials of the concern walk through, puffing away on a cigar.

The workingmen, seeing this, are thereby encouraged to disregard the rules whenever the occasion arises. Usually they smoke cigarettes. When finished with the smoke or when one of the bosses appear on the scene, they hurriedly throw it away. Ofttimes it falls among refuse or waste paper.

While I have never seen it start a conflagration, yet the danger is imminent. Employers would show wisdom if they would at least pay some attention to the rules that they put up for others. The employer violating his own rules sets a bad example that may eventually cost him a great sum. This is one way that an employer can encourage fire prevention in his establishment. Don't do anything yourself that you don't want others to do, which may cause a fire.

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**No. 45** Fire Buckets Provided in Dwellings. — The average six-year-old child possesses enough common sense to realize danger, on seeing a burning or glowing match or other particle, and will immediately collect courage enough to stamp on and smother with its tiny foot the cause of many great fires. In my opinion, no matter how unintelligent persons may be, fire itself is a dread to them, and they will use every precaution, with the exception of one. This neglect has caused entire cities to be wiped out by fire, especially in the New England territory, where frame houses are numerous. Property owners have neglected to place pails of water about their premises. One pail of water can do more good at the beginning of a fire than thousands of pails can do after the fire has been burning three or five minutes, and especially so in a frame dwelling.

To provide one bucket of water in a conspicuous place in each room and hallway of a dwelling, no matter how small or large the dwelling may be, would, in my opinion, be a real "Safety First" act, as far as fire prevention is concerned. One might say that a pail of water, conspicuously placed in a room, would spoil appearances, but it would not spoil the appearances half so much as a small fire would.

The Chelsea and Salem (Mass.) fires are examples. A small pail or two of water at the start of either of these great fires would have done the trick that the fire department failed to do five minutes later, due to the high winds.

Our grand fireproof buildings have their fire extinguishers and are sprinklered throughout. Why not have the property owners protect their tenants and themselves by placing these pails of water as I have suggested in the frame dwellings?

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**No. 46** Fire Prevention and Fire Protection in the Factory.—The prevention of fire, through eliminating or safeguarding conditions which tend to start or stimulate fires, and the protection of property subject to exposure to fire hazards, are live issues, an actual investment, which will pay handsome earnings in reduced fire and liability premiums,

in increased plant efficiency and in greater or lesser security from the danger of interrupted production because of fire, exactly in proportion to the efficient effort that is made in this direction.

A manufacturing plant in which proper attention is paid to the subject of fire prevention and fire protection, in which self-inspection is thoroughly, conscientiously and regularly carried out, in which safety from fire is an important consideration and thoroughly understood, in which there is ample and suitable apparatus for fire extinguishment and in which there is a corps of trained, able men who are thoroughly organized into a factory fire department for inspection and fire fighting, is a very desirable risk from a fire insurance standpoint, and the attention which is paid to the subject is very clearly reflected in the rates at which insurance can be obtained.

The elimination of rubbish and dirt, and the general atmosphere of orderliness which exists in such a plant is an incentive to every workman to live up to the character of the institution. Clean surroundings, clear passageways and floors, and stock piled in an orderly manner are reflected in clear, orderly minds, unhampered movements and, in consequence, a minimum of mistakes and lost motion due to disorderly mental conditions in the persons engaged in production. No man can do his best when surrounded by rubbish and confusion. Every man is subconsciously influenced by cleanliness and order, and his output will reflect his mental condition.

The confusion and financial loss attendant upon every disastrous industrial fire is too well known to need comment.

In this there is no such thing as luck. Fancied security is a dangerous shoal, as many recent disastrous fires bear eloquent testimony. "Eternal vigilance is the price of safety." "An ounce of prevention is worth a pound of cure," but, as "All fires are the same size at the start," suitable apparatus for the extinguishment of fire is a necessary adjunct. Such apparatus must not only be suitable; it must be accessible, well distributed and thoroughly understood.

The importance of sprinkler equipment is too well known to need much comment. When values are large enough, the sprinkler installation will soon automatically return the investment made for the installation, and then pay a handsome income in reduced premiums alone.

Automatic fire pumps and an ample primary and an independent, inexhaustible secondary water supply to sprinklers and fire hydrants are important considerations. These should be installed in strict conformity to the requirements of approved standards; all gate valves, indicator posts, dry valves, and risers should be numbered for convenience in designation.

All controlling valves should be sealed, open or closed, as the case may require, with common car seals. These offer no discernible resistance to opening or closing of valves and are a distinct evidence in case of tampering. No knife or key is required, as in the case of straps or locks, although locks can be used in connection with seals for purposes of inspection, obviating the necessity of breaking the seal when inspections are made. Dry valves should be regularly inspected and properly maintained; they should be thoroughly protected from frost and tripped twice per year during suitable weather conditions.

All drain valves and piping should be located in non-freezing temperatures. In winter closed systems the drip valves should be located next to the controlling valve and in a non-freezing temperature; these systems should drain back to the controlling valve, so that any slight leakage will be removed by the drip and not permitted to run into exposed sections of piping to freeze and obstruct. This is also true of drains on outside or openhead installations for protection from exposure fires.

Water barrels should be kept filled to the brim, equipped with an ample number of buckets and well distributed.

Chemical extinguishers should be abundant, well located and thoroughly and regularly inspected and tested to see that they are filled, operative, and nozzles unobstructed.

Sand and sawdust tubs and buckets

should be well located, accessible, kept in perfect order, and well filled.

Fire alarm systems should be inspected and tested at least once per week.

All alarm boxes and chemical extinguishers should be located in the center of white targets with a red border; if located on a post, paint a wide white band with a red border entirely around the post to make it easily discernible from every direction. Place a chemical extinguisher at each watchman's recording station. In emergency the watchman knows unhesitatingly the location of his station, and knows that at that point he will find an extinguisher; he can record his alarm, and he has at his immediate disposal the means for first aid.

In the yard place a suitable and ample number of hydrants; around each build a first-class hose house, with shelves for hose and racks for equipment; place in each sufficient rubber lined hose, so that every portion of the outside of the buildings can be reached from one or another of these hose-houses, and have the hose connected to the hydrant and a nozzle or play pipe at the opposite end ready for instant use.

Equip each house with an extra play pipe, coupling wrenches, extra hose and nozzle gaskets, a hydrant wrench in place on the hydrant, hose straps, axes, crowbars and a lantern. Have the house well ventilated and the doors clear of obstructions so that they can be swung wide open. Seal the doors with a common car seal in conjunction with a padlock. In emergency the doors can easily be jerked open and for purposes of inspection the lock may be used instead of breaking the seal. A broken seal is instant evidence of tampering by unauthorized persons.

Provide one or more hose reels or carts in centrally located positions, equipped with a suitable length of extra hose and equipment such as spanners, lanterns, straps, and hydrant wrenches to supplement the hose and apparatus at the individual hose and hydrant houses.

Having arranged a suitable and practical equipment, the next important thing is an organization. The care, inspection, and maintenance of your fire protection should be placed under the supervision of a competent official vested with undisputed authority. He should have a competent inspector to make daily inspection of all valves and equipment, reporting on a suitable blank form to his superior. He should thoroughly inspect daily all valves, indicators and hose-house equipment. He should make weekly inspection of all extinguishers, inside hose and water barrels, and be constantly on the alert to detect unsafe conditions and practices.

A thoroughly organized and drilled private fire department is an invaluable and indispensable aid in a campaign of fire prevention and protection. The best men in your plant are not too good for this service. Select men who are well distributed throughout the plant, active, alert, and tractable, preferably residents of the vicinity of the factory.

Select a capable chief and an assistant chief; divide your fire department into squads of four men each, one of whom is captain, two of whom are nozzle men and the fourth is hydrant man.

For chief, assistant chief, and captains select, preferably, men who are naturally in authority, such as foremen or assistant foremen. In an emergency men look naturally to those who are customarily in authority. Pay each member of your fire department a small salary in excess of his regular pay, to pay for damaged clothing and to give the members added incentive to good work.

Have weekly fire drills of about one hour's duration. For purposes of drill, select some particular and different location each week for a supposed fire. Let the location of the supposed fire be a secret, unknown to any member of the department until you sound the alarm for drill. The conditions are then as nearly actual fire conditions as it is possible to make a drill. The chief must lay his plans for fighting the supposed fire within the time of the sounding of the alarm and the arrival of the department at the scene of the fire. Keep an accurate account of the time consumed between the sounding of the alarm and the time when the hose is laid, and, in some cases, when practicable, put water on the imaginary fire.

After the run to and attack upon the fire, get the chief and the assistant together and comment upon the method of attack. Point out the good features of their method and suggest better methods when you can. Give credit when credit is due, but condone mistakes and let them feel that you appreciate the effort made.

You will find that condemnation and discipline are rarely necessary. Give the workmen of the plant to understand, unmistakably, that a fire drill is an important part of your business and that ridicule, hindrances, or obstructions to the fire department are not to be tolerated. They will soon get the spirit of the campaign and much interest will be shown.

After the drill at imaginary fires, climbing ladders with hose, practice at coupling and uncoupling hose, and practice in holding nozzles and directing streams can be engaged in, stimulating a spirit of friendly rivalry between different members and companies of your department. Competition in time consumed is a splendid aid toward increasing the efficiency of the department.

An hour's work with the apparatus each week is sufficient to keep the department thoroughly organized, and at the end of the period of time you can send them individually to different sections of the plant for inspection.

For purposes of inspection, divide your factory and yards into as many sections as you have individual members of your company or department. Include in each section, as far as possible, the controlling valves for the water supply of that particular section and the apparatus provided for that particular section.

During the inspection let each man note the location and condition of all apparatus and water systems, the location of inflammables and high tension electric apparatus, the general condition of the plant, especially cleanliness, orderliness, and accessibility of all protection apparatus.

A suitable printed form should be provided for his report. He should give the number, location, and a complete inventory of each hose house in his section, noting also the condition of the equipment and whether or not the hose-house doors are clear and unobstructed. He should give the number, location and type of each gate valve, dry valve, riser, or post indicator in his section, the building or section which it controls, whether open or closed, sealed or not, water pressure, and, in case of a dry valve, whether set wet or dry, air and water pressures and whether the drains are open or closed.

Particular phases of the protection and regulations in his particular section should be noted, whether waste cans are in good condition and kept emptied, whether or not sprinkler heads are unobstructed, and whether or not fire doors are in good condition.

As an added incentive to thoroughness, a trap, laid for the unwary, in the shape of an obstructed fire door or an improperly closed valve (a watchman in the immediate vicinity for safety's sake in emergency) will serve a spur for many months.

This inspection by the member of the fire department serves a two-fold purpose. He gives you a thorough report on conditions in his section and, most important of all, he keeps himself thoroughly posted on the location and character of all protective apparatus, and on the location, purpose and condition of all valves and water systems.

Should he prove by his report that he is thoroughly conversant with the equipment in the particular section which he has inspected, he should be rotated to the next section for the following week. Should he fail to make a report which satisfies you that he knows the section, he should repeat his inspection of that section on the following week's drill.

In this manner you soon have a thoroughly drilled fire department, every member of which is thoroughly and intimately acquainted with the apparatus and water and sprinkler system of the entire plant. If you have a fire department large enough to safely protect your plant, they can, by this system, thoroughly inspect the entire plant in about an hour.

One plant, where this system is in successful operation, has a maximum

force of 1,400 men and a fire department of 14 members, one for each 100 employees.

After each week's inspection, look over carefully the reports that have been turned in and make necessary corrections upon them in red ink.

At the following week's drill return the inspection report to the fireman who made it and with it a short note, calling his attention to the mistakes, if any, he has made and commend him for the good work he has done. He will profit by his former mistakes and correct them and you will be surprised at the percentage of perfect reports which are turned in after a very short time.

It has been found that, under this system, the interest of the firemen is so great that there is rarely evidence of carelessness. Should there be, the desirability of membership is so great that a suggestion of a reprimand is sufficient to call the delinquent one back into step. The results of this system in the spirit of co-operation and in efficiency are marvelous.

As has been written previously, the person or official in charge of fire prevention and fire protection should have undisputed authority; he should, by firmness, thoroughness and tact, win the confidence and co-operation of all department heads, workmen, and members of the fire department. As has been truly said, "With co-operation you can do almost anything; without it you can do nothing."

## COMMENTS BY MEMBERS OF THE COMMITTEE.

I favor Article No. 38 with my vote this month because of the writer's suggestion of the moving picture medium of instruction in fire prevention. Let the fire protectionists "get on the job." There is no better method known than this for educating the public. It is the greatest of all mediums of instruction, particularly for those who are unable to obtain knowledge through print or script. Label the films of fire prevention instruction in the principal foreign languages spoken in this country, and let the fire marshals have them reproduced in all the settlements of these people. Boards of Education should do likewise so the child may know the value of safety, and practice it.

No. 38 has touched on one phase of fire prevention that, I consider, is essential for a successful solution of the human element side of the question. It will be necessary to begin at the foot of the ladder and teach the young. This can be done by fire protection associations, sending out films covering the matter; also, as No. 38 suggests, it can be a part of school routine. As I understand it, our losses in this country for 1914 exceed the previous year by some $10,000,000, which, in my opinion, goes to show that it is difficult to teach an old horse new tricks. No. 38 is right. Begin with the young; make it a part of education. I vote for No. 38.

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*To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The work and efficiency of public fire departments, fire prevention bureaus, and private fire brigades present many important subjects for discussion.*

*Short, practical articles are wanted on every subject that will prove of value to firemen (public or private), and to inspectors and others interested in The Fight Against Fire. Articles may cover methods and practices relating to fire fighting and fire prevention by public departments, faults of construction that create fire perils, the fire hazards of processes that endanger life and property, how firemen and public inspectors may qualify themselves for advancement, the character and use of apparatus and other equipment, private fire brigade organization and drill, employes' exit drills, regulations and requirements of all kinds, etc.*

*In passing upon the articles submitted, the Committee to Award Prizes will be influenced, in each case, by the evidence an article gives of its writer's knowledge of and interest in fire prevention or fire extinguishment, in general, and by the practicability and adaptability of the writer's suggestions and ideas.*

*Articles will be received from any person competent to discuss the questions of fire prevention and fire extinguishment. Contributions are especially invited from members of city fire departments and fire prevention bureaus, members of well established private fire brigades, insurance engineers and others. No consideration of any kind is required for the privilege of competing.*

*Drawings, sketches and photographs may be submitted whenever they will aid or supplement the texts of articles.*

*Blanks upon which to submit articles for this department of SAFETY ENGINEERING will be furnished on application. But any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

I select No. 37, as the writer brings forth one of the most hazardous conditions that exist in any class of buildings today; that is, the open rotunda in a department store. There are various building of this class in our large cities with this feature combined, with every other precaution against fire taken. Just why architects or engineers seem to reconcile themselves to such an unprotected vertical opening is more than I can understand. I feel that laws should be enacted by the authorities to forbid this dangerous practice. The writer shows good judgment in handling this class of building, and his cures for the hazards are excellent.

I select No. 36 as being about the most impressive. The subject must be taken into consideration in building or remodeling structures, bearing in mind health, fire prevention and as an honor to the builder.

My selection for first prize is No. 36. It is very good and practical, and, if carried out, would reduce the enormous fire loss in this country and also reduce the insurance rates. Better construction should be the slogan in all communities.

I select No. 36. There is nothing especially new in the article, but it emphasizes a thing that needs frequent emphasis. In matters of fire protection, the public has not yet learned the value of the proverbial "ounce of prevention" nearly so well as it needs to know it.

## SAFETY IN HOSPITALS.

The Dahlstrom Metallic Door Company has published a booklet with the title "Safety First for Hospitals," giving particulars of fireproof metal doors and trim. Intended principally for the officials or owners of hospitals, the booklet has technical information of value to architects. A fire in a building today is regarded as a crime when caused by conditions that are preventable. The sick and physically helpless are entitled to full protection, and an explanation of what may be procured for protection should make commissioners, owners or managers of hospitals eager to supply the necessary funds to make interior fireproofing possible. From the foundation to the roof of the ideal hospital fire-resistive material is used, and its doors, windows and trim are of steel.

## HAZARDS IN DEPARTMENT STORES.

In an article on "Fire Hazards in Department Stores," published by *The Survey*, Anna Crawford Phillips, who was the chief investigator for the New York State Factory Investigating Commission, said:

"Immense open floor spaces, highly inflammable stock, and the presence of the public in unlimited numbers constitute the most obvious elements of the fire and life hazard in stores. Because of these factors, heads of fire departments do not hesitate to express their constant dread of fires in stores with possibilities of fatal results. The reports of the New York State labor department have repeatedly called attention to the fearful consequences in the event of a fire in a store when crowded with people.

"In the 80 stores selected for the study in New York State, the total number of employes exceeds 60,000—the daily attendance of customers running into hundreds of thousands. That this number is conservative is indicated by the results of a study of the crowds in department stores made in New York City at the height of the last Christmas season. By actual count one store employing over 4,500 persons contained, at one time, over 9,000 customers.

"Of the 80 stores visited, 75 per cent had no stairway enclosed in fire-resisting material, such as wireglass or solid fire-resisting walls. This means that in these stores, buildings five to ten stories high, the chief and natural means of escape is dangerous, if not worthless.

"If the shopper will make but a cursory observation of stairways in stores he will find conditions varying from the open stair, winding around an open elevator shaft—which is simply a flue—to

the stairway in a fire-resisting enclosure, separate from the building and known as a smoke-proof tower. There will be found landings used for the display of merchandise; isolated flights of enclosed stairways, the use of which necessitates coming out into the store on each floor; and stairways emptying on the street floor distant from any exit.

"Stairways are commonly found in rotundas in the center of the building and others, sometimes enclosed, either in the center of the ground floor or on a side wall distant from any street exit. As the street floor is always the most crowded, such construction makes possible the addition of the crowds from upper floors to the ground floor, and decreases the chance of emptying a store in case of panic, without serious accident.

"The open well and rotunda—found in 35 of the stores visited—is recognized to be such a dangerous feature that no new store buildings of this type are now permitted in the city of New York. These open rotundas, extending through and connecting floors, are a traditional form of store architecture, because of the belief that the public is impressed by the sense of light and airiness and the effective displays made possible. Patrons, however, have never known or realized that rotundas constitute one of the gravest dangers to themselves and to employes.

"Automatic sprinkler systems are a fire-protective apparatus, widely installed in stores, the resulting reductions in insurance rates and questions of financial credit encouraging such installation.

"The amount of protection afforded by a sprinkler system is dependent on the degree of efficiency in which it is maintained. Such maintenance was frequently found to be imperfect and careless. Goods were found stocked so as to interfere with the operation of spinkler heads; in some stores false ceilings of cloth were stretched between sprinkler heads and merchandise so that heat caused by any fire would fail to reach and operate immediately the automatic device which releases the water.

"It was repeatedly found during the investigation that the greatest carelessness was shown in the manner of collection and disposal of waste and rubbish; the use of inflammable packing materials such as excelsior, hay, paper, etc.; the lack of safeguarding; the use of such highly inflammable materials as alcohols, turpentine, gasoline, etc."

## LOCKJAW FROM SMALL WOUNDS.

The National Safety Council has published and distributed for employes a poster on "Lockjaw Caused by Small Wounds." It says:

"Several hundred cases of infection and blood poison have recently been investigated in one State, and it was found that over 600 of them were caused be neglecting slight injuries, such as scratches, pricks of the skin, nail punctures and small cuts. Big wounds are generally taken care of by the doctor—it's the little wounds that are left dirty and cause most of the cases of lockjaw and death. Whenever you get a little wound at your work—even if it be only a scratch—be sure to tell your foreman at once, so that he may arrange for proper treatment of the injury immediately."

## ROOFING MATERIALS.

The American Railway Engineering Association's committee on buildings has submitted a report on the selection of roofing material after considering the following:

Chance of leaks, due to character of construction.

Probable life, including chance of damage by the elements and by wear from other causes.

Fire-resisting value.

Cost of maintenance.

First cost.

The important materials:

Bituminous substances, applied with felts made of rags, asbestos or jute.

Clay and cement products and slate.

Metals.

As to manner of laying the roofing materials they may be placed in one of two classes: Materials for a flat roof, cemented together, as a coal-tar pitch-and-gravel roof or an ordinary tin roof; and materials for a steep roof, laid shingle fashion.

# ELEMENTS OF SAFEGUARDING

## RAILINGS AND WIRE NETTING AS GUARDS.

*By F. W. Bail.*

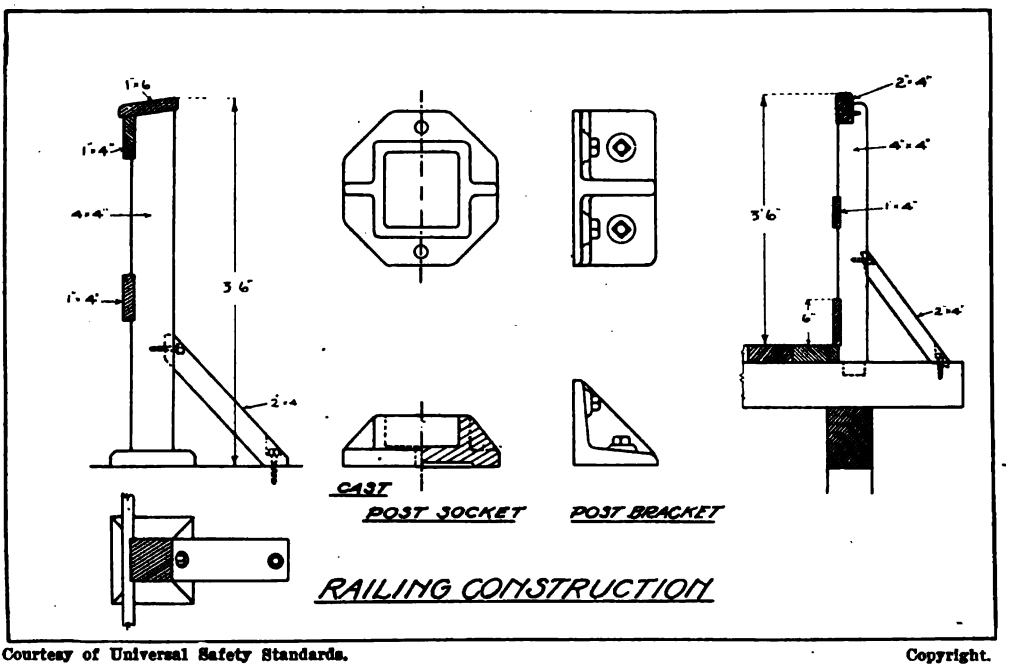
WHAT parts of the mechanical hazard of a plant can be guarded by a railing or a bit of well-placed netting? Many superintendents, foremen and workmen have thought of guarding an entire plant, or a particular department; but immediately the word "guard" suggests the cost of having castings designed and made for each machine and banishes the happy thought to do a little guarding until one of the "boys" is hurt, when the light returns again, only to disappear behind the cloud of cost.

Home-made guarding is not to be despised. Economy demands that, with few exceptions, all transmission and machines must be guarded with a common material which can be shaped, fitted and set up on the floor of the plant. Pipe fittings, angle iron, wire netting for the metal shop and the like, supplemented with rigid wooden construction for the wood working shop, answer the demand.

Approximately 80 per cent of the mechanical hazard of the general machine shop and 60 per cent of that in the average wood working shop can be obviated by the careful placing of properly constructed railings and wire netting. This assertion is based on the statistics of the majority of the casualty insurance companies and the descriptions of the methods of guarding, as practiced by many large corporations that are doing much to promote industrial safety.

All belting can be guarded by the use of angle iron and wire netting. The accompanying drawing of guarding for a motor-driven friction drill gives a good example of the belting and various machine parts which can be guarded with the materials. The netting should not be less than No. 12 gauge and not larger than three-eighths of an inch mesh, unless a clearance of five inches or more is provided. Most power-driven gears can be enclosed by an angle iron frame, filled in with wire netting of the specifications given for belting.

Many extremely dangerous machine

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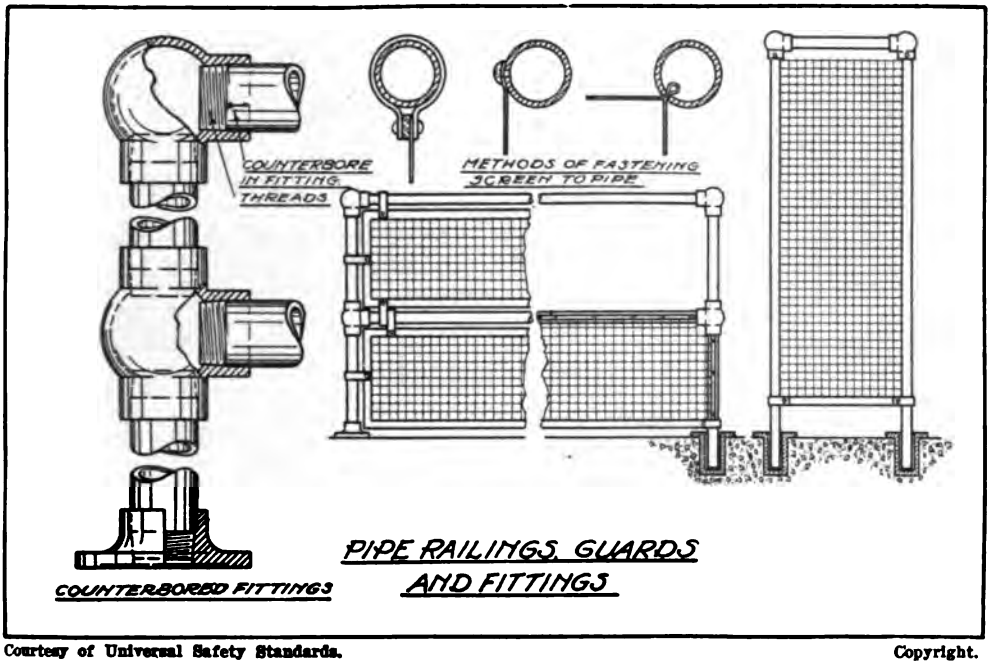
COUNTERBORE IN FITTING THREADS
METHODS OF FASTENING SCREEN TO PIPE
COUNTERBORED FITTINGS
PIPE RAILINGS, GUARDS AND FITTINGS

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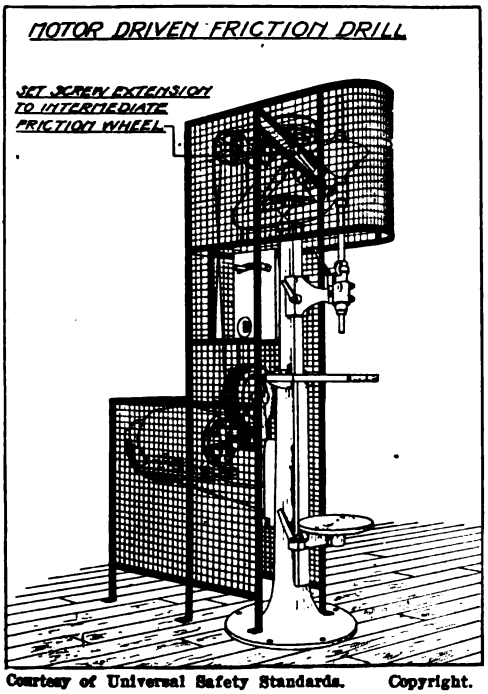


Courtesy of Universal Safety Standards. Copyright.

parts can be guarded by railing of the types indicated in the accompanying drawings. All railings should be at least 3 feet 6 inches in height. Removable railings, set in cast iron post sockets, are convenient where the guarded parts must be accessible for oiling or adjusting. The railing should be filled with screen when nearer than 18 inches to the part guarded. Where stairs, elevated platforms, or pits are guarded by railing, a 6-inch toe board should be supplied.

A plant equipped with these home-made guards is on the home stretch of the "Universal Safety" track.

## SPRINKLERS SHUT OFF.

Just before fire destroyed the building of Gould, Wells & Blackburn, wholesale grocers in Madison, Wis., on February 13, an automatic sprinkler system had been installed. A fire in a barrel of peanuts had been extinguished by a few sprinkler heads, and the fire chief and a member of the firm shut off the equipment. Three hours later fire started again and burned through to the roof. Firemen were unable to go into the basement to open the sprinkler valve. The loss was about $100,000.

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The mania for speed often leads the superintendents and those who direct the work, in building operations, to put speed before safety. —*A. E. Davidson.*

# DECISIONS REGARDING LABOR CASES.

The United States Department of Labor, Bureau of Labor Statistics, recently published Bulletin No. 152, a book of 304 pages. The bulletin contains decisions and opinions of courts affecting many phases of the labor question. Among the subjects included are the 8-hour law, the anti-trust law, convict labor, employers' liability, factory regulation, railroad full-crew law, safety appliances for railroads, unemployment insurance, workmen's compensation, etc.

Following are abstracts of cases recorded in this bulletin:

The Supreme Court of Wisconsin decided that while the State compensation law requires the employer to furnish such treatment as may be reasonably required for not more than 90 days, this does not authorize an injured workman to hire his own physician and run up such bills as he sees fit to charge against his employer without giving notice of his need of medical attention.

The same court upheld the findings of the Wisconsin Industrial Commission which awarded benefits to a man injured while intoxicated, though his employer claimed that the worker's condition was wilful misconduct eliminating him from consideration. In another case, however, an employe's being intoxicated was held to amount to contributory negligence.

A convict who worked under the supervision of another convict for a private company was killed by the fall of a rock improperly propped. He worked under the supervision of another convict and there was unmistakable evidence showing that the latter was, so far as the men under him were concerned, the agent and servant of the company employing them. Thus the killed man had no option to quit, whatever may have been the dangers of the service or the incompetency of the man directing his work. The court held that while an employer may make a convict his agent and the superintendent of the work of other convicts hired, he cannot receive the benefit of such service and at the same time exempt himself from liability for the negligence, if any, of such an agent.

The widow of a man killed while working in a grain elevator containing machinery for cleaning, sorting, shelling and mixing grains, improving their grades and converting them into new, improved or different forms was awarded compensation in the Supreme Court of Kansas. The defendant argued that a grain elevator did not come under the heading of manufacturing establishments, but the court decided that the operations mentioned rendered the elevator different from what is ordinarily meant by its name and that a grain elevator equipped with such machinery came under the State law governing manufacturing establishments and the provisions of safety to be observed there.

A New Jersey workman lost the first phalanx of the second finger, all of the third finger and the first phalanx of the fourth finger; the Court of Common Pleas had awarded benefits for each injury separately, totalling $357. The employer wished to have the benefits computed concurrently, reducing the sum by the limitations of a maximum payment of $10 per week so that the total award would have amounted to $249.50. The Supreme Court, however, called this claim fallacious, inasmuch as the awards were really a statutory method of ascertaining the damages by a specified multiple of the weekly wage payable normally in weekly instalments and reduced to present value if computed to a lump sum. The fallacy on the part of the employer consisted in regarding the awards for permanent injury as payments for the employe's time as though the disability were only temporary.

## CEMENT USERS.

The report of the proceedings at the eighth annual convention of the National Association of Cement Users in Kansas City, Mo., on March 11-16, 1912, just published, has 820 pages, with many illustrations and plates. As President Humphrey said, the association met to deal with subjects of the largest consequence, "and the effects of its discussions will be to improve the practices of concrete design and construction throughout this country and other countries."

## FIRES AT PORTO RICO.

Fires at Anasco had been so numerous that a newspaper of San Juan predicted another fire "in a few days." In December, 1914, the place had 56 fires in dwellings and stores. In January, 1915, 32 houses were burned. The newspaper said: "Members of the Anasco City Beautiful Club, or whatever the firebrands may call themselves, are now able to point with pride to some of the new structures which have arisen from the ashes since the receipt of insurance moneys after the first conflagration."

# MATERIALS, APPARATUS, PROCESSES

## A FIRE DOOR IN WHICH FIRST COST IS FINAL COST.

The fire resisting value of a wood door encased in tin depends upon the exclusion of oxygen from the wood, thereby retarding or preventing combustion, and also upon the degree to which bulging in the covering can be prevented when the door is exposed to fire. To obtain these results the tin covering must be so applied that the joints between the plates will remain intact and provision made for the escape of the gases generated from the wood core.

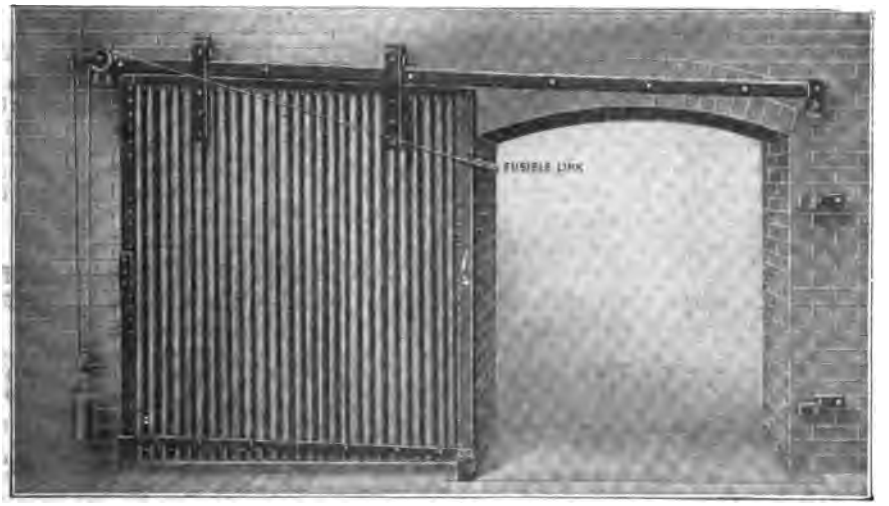
The Saino sheet metal fire door, which is claimed to be radically different from any fire door heretofore known, is made of two walls of cross-laid 22-guage galvanized steel with air chambers and sheet asbestos between and contains no wood in its construction; patent telescopic channels and joints providing for expansion and contraction along straight lines.

Other points claimed for the Saino fire door by its manufacturers, the Saino Fire Door & Shutter Co., 141 Broadway, New York, are that it not only contains no wood, but no material which is subject to combustion, dry rot or decay; that it is durable and does not require repairs; that its weight is exceedingly light, being only five pounds per square foot.

All the structural parts of the Saino fire door are visible. It is attractive in appearance. The initial cost is low. It is durable and easy to maintain.

Tests and actual service have demonstrated that the retardant qualities of the Saino door are not materially affected by sudden cooling and impact due to the application of a fire stream while under extreme heat; also that the radiation of heat through the door and the amount of flame, heat or smoke passing round the edges of the door are reduced to a minimum.

In the well-known Equitable Building, in Broadway, New York City, Saino fire doors, operating by fusible links, were specified and installed to protect elevator shafts and main corridors in pockets behind the walls. In the great plant of Sears, Roebuck & Co., the largest mercantile plant in the world, Saino fire doors are used in quantities. A large number of other important installations have been made.



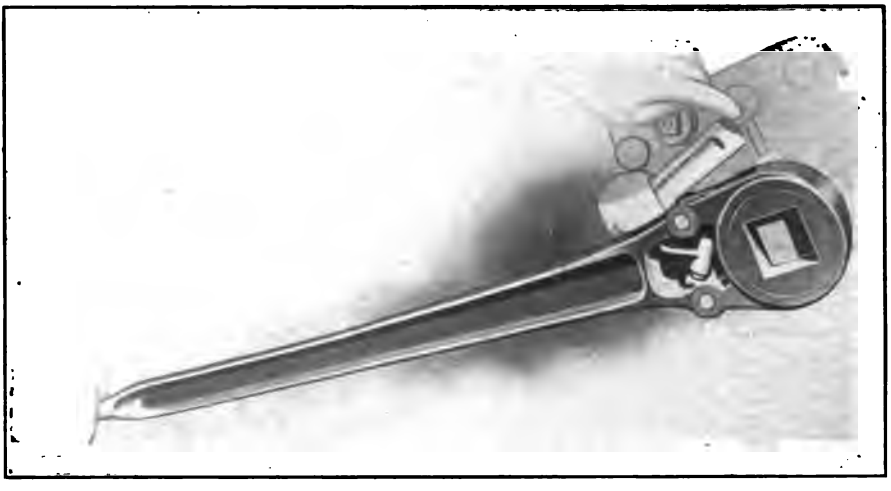

Saino Fire Door, Equitable Building, New York.

Saino fire doors can be installed in any manner that other standard fire doors are installed —sliding, swinging, vertical, etc.

An interesting booklet has been published by the Saino Fire Door & Shutter Company, 141 Broadway, New York, which explains fully the construction and good points of these doors, and gives information of service to those interested in fire doors and shutters. The book contains many illustrations. Shows how Saino fire doors keep the ultimate cost down by doing

away with the cost of maintenance and how and why it is claimed this type of door affords permanent fire protection.

most without exception they show an underwriting loss. The Springfield participated in this experience.



Hessteel Automatic Safety Wrench.

## HESSTEEL AUTOMATIC SAFETY WRENCH.

By use of this wrench hoppers of drop-bottom or side-dump cars can be opened by one man in about half the time it takes several men to accomplish it with the ordinary wrench, and with absolute safety, thus saving time, labor and money and avoiding all chance of accidents.

This wrench is well designed, built to stand hard abuse, is simple in its operation and durable in all respects.

Illustrated here is the dangerous operation in this work, the opening of the hopper, which is made rapid and safe by means of this wrench, the method being to quickly lower the wrench, when the pawl springs out, allowing the hopper door to drop.

The Hess Steel Company, Bridgeton, N. J., manufacturers of the wrench, has issued an illustrated booklet, describing its safe and efficient features in detail. A copy can be obtained by addressing the company.

## SPRINGFIELD F. & M. INS. CO.

Three items in the strong annual statement of the Springfield Fire & Marine Insurance Company of Springfield, Mass., show increases of amounts as follows: Assets, $26,501; premiums written, $137,377, and reinsurance reserve, $286,130.

An increase of the fire loss in the United States and Canada of $10,868,000 in 1914 over 1913 is reflected in the experience of fire insurance companies throughout the country. Al-

## AETNA INSURANCE COMPANY.

The annual statement of the Aetna Insurance Company of Hartford, Conn., for the year ending December 31, 1914, shows total assets $23,400,526.99 of which $11,668,448.39 was surplus to policyholders. In 96 years this company has paid losses to sufferers by fire $144,393,663.21.

## UNDERWRITER'S LABORATORIES' RECENT APPROVALS OF APPLIANCES.

AUXILIARY TANK FOR FUEL-OIL ENGINES, "JASCO." Janney, Steinmetz & Co., mfr., Philadelphia, Pa. Drawn steel tank with brazed joints in capacities up to and including 10 gals., for use with fuel-oil engines as an auxiliary reservoir on engine, between underground storage tank and injector. All pipe connections are at top of tank, with overflow leading to underground storage tank.

CABINETS. Metropolitan Engineering Co., mfr., 1250 Atlantic Ave., Brooklyn, N. Y. Type "E" equipment, consisting of a sheet-steel cabinet, Cat. No. 949, enclosing a two-wire cartridge fuse cutout base with meter testing clips, Cat. No. 159. Rating 30 A., 25[illegible] V.

CARTRIDGE FUSE CUT-OUT BASES. Metropolitan Engineering Co., mfr., 1250 Atlantic Ave., Brooklyn, N. Y. Type "E" equipment, consisting of a two-wire cartridge fuse cutout base with meter testing clips, Cat. No. 159, enclosed in a sheet-steel cabinet, Cat. No. 949. Rating 30 A., 250 V.

DOOR FRAMES, METAL. Zahner Metal Sash & Door Co., mfr., Canton, O. Frames for single swinging doors mounted singly or in pairs.

DOORS AND SHUTTERS, METAL-CLAD. Penn Metal Co., mfr., 201 Devonshire St., Boston, Mass. Standard 2½-inch tin-clad fire doors.

DOORS AND SHUTTERS, METAL-CLAD. Consolidated Metal Fireproofing Co., mfr., 414-20 E. 125th St., New York, N. Y. Standard 2½-inch tin-clad fire doors.

DOORS AND SHUTTERS, METAL-CLAD. The Keystone Fire Door Co., mfr., 1231 Irwin Ave., Pittsburgh, Pa. Standard 2½-inch tin-clad fire doors.

DOORS AND SHUTTERS, METAL-CLAD. Perritt Iron & Roofing Co., mfr., Rosedale St., near Penn Ave., Pittsburgh, Pa. Standard 2½-inch tin-clad fire doors.

DOORS AND SHUTTERS, METAL-CLAD. Wayne Junction Metal Cornice Co., mfr., 4545 Wayne Ave., Wayne Junction, Philadelphia, Pa. Standard 2½-inch tin-clad fire doors.

DOORS AND SHUTTERS, COUNTERBALANCED. Winnipeg Ceiling & Roofing Co., Ltd., mfr., Winnipeg, Canada. Corrugated steel counterbalanced door for elevator shafts. Standard for protection of openings in elevator shafts.

ENGINE, STATIONERY, "MUNCIE" TYPE C. Muncie Oil Engine Co., mfr., Muncie, Ind. Internal combustion engine operating normally with fuel oil. Engine is started by pre-heating ignition head with fuel oil burner. Fuel-oil supply tank located underground and auxiliary tank having capacity of not more than 5 gals. and provided with overflow connection is attached to engine frame.

FASTENER FOR FLEXIBLE TUBING. Christo Mfg. Co., mfr., Richmond, Va. "Bull-Dog" fastener, consisting of a square, galvanized, sheet-steel washer having internal edges formed to engage with surface of tubing. For securing ¼-in flexible tubing in switch and outlet boxes.

FUSES, CARTRIDGE-ENCLOSED. Killark Electric Mfg. Co., mfr., 2005 Locust St., St. Louis, Mo. "Killark," enclosed cartridge fuse, 250 V., 0-200 A. per foot. Star-section, twisted steel rod, copper plated and sheathed in No. 32 B. & S. gauge copper, and weighing 7 ozs. per foot.

LIQUID GAS APPARATUS, PORTABLE. "Blaugas Welder." Atlantic Blaugas Co., mfr., 25 Madison Ave., New York, N. Y. Portable heating and welding system, consisting of a tank of Blaugas an expansion tank for same, and a tank of oxygen (not supplied by this concern), all under pressure, together with reducing valves, torches and connecting tubing, securely mounted on a substantial truck.

UNIONS, GENERAL. Rockwood Sprinkler Co., of Mass., mfr., Worcester, Mass. "Rockwood" Pressed Steel Unions.

## NEW SAFETY PUBLICATIONS.

Recent publications of the Consolidated Expanded Metal Companies, 101 East 40th street, New York, include "Load Tests," "Sewers and Conduits," "Steelcrete Metal Lathe," "Tanks—Circular, Square, Rectangular," "Highway Bridges and Culverts," "Retaining Walls" and "Safety First—Steelcrete Guards." Each of the publications contains valuable data, tables and specifications. A copy of any or all of them may be obtained free of charge by addressing the company.

MOLECULAR STRAIN FINDER.

For the rapid and correct examination of lenses used in "Saniglas" and "Isafe" eye protectors.

INSULATING MATERIALS. Woodbridge Pottery Co., Woodbridge, N. J. Colored vitrified porcelain, having non-absorptive, non-combustible and insulating qualities, rendering it suitable for use in low-voltage electrical appliances, where ordinary white porcelain has been accepted as standard. Manufacturers of such devices desiring to use this material should submit samples in commercial form for examination and test. The properties of this material for high tension work have not been investigated.

LAMP GUARDS. Appleton Electric Co., mfr., 212 N. Jefferson St., Chicago, Ill. "Appleton" Vaporproof Lamp Guards. These devices consist of "Unilet" conduit boxes, each fitted with a glass globe and metal guard. Type G, 660 W., 250 V.

LIGHTNING RODS. St. Louis Lightning Rod Co., mfr., St. Louis, Mo. "Kretzer" copper cable weighing not less than 8 ozs. per foot and with strands not less than No. 17 B. & S. gauge. Copper tubing not less than ⅝ in. in diameter and 1/32 in. thick. Star-section, twisted, hot-galvanized steel rod weighing approximately 5¼ ozs.

## MOLECULAR STRAIN FINDER.

This instrument has been devised by the Julius King Optical Company, 10 Maiden Lane, New York, for the rapid and correct examination of lenses to be used in their "Saniglas" and "Isafe" eye protectors, which have met with the approval of large industrial concerns throughout this country.

By means of this strain finder, which is a modification of the Nicoll Prism Polariscope, the condition of internal strain or its absence is seen

readily. If lenses are not annealed properly, intermolecular strain is set up between the parts, and there is less resistance to breakage. Such lenses are immediately rejected for use in "Saniglas" and "Isafe" eye protectors.

## SAFETY, HEALTH, EFFICIENCY.

Under this title the E. I. du Pont de Nemours Powder Company of Wilmington, Del., has issued a little book of great value to its employes. Chapter headings embrace Accident Prevention, Safety First, Goggles, Fire Protection, Health Hints and Efficiency.

Impressing the importance of "Safety First" on its employes the company states: "Remember, the safe man added to safe methods and safe appliances make a safe business. We want them all and are prepared to do our part—will you do yours?"

# RECENT CATALOGUES OF SAFETY DEVICES AND METHODS

By writing the firms the publications may be obtained without cost.
Please mention SAFETY ENGINEERING.

### Asbestos Roofing.

H. W. Johns-Manville Co.,
Madison Ave. and 41st St., New York.

Useful and handsome book of service to the architect, engineer and builder, describing the specifications for applying J-M Asbestos fire-resisting roofing over sheathing, concrete surfaces; the J-M Asbestoside for siding of frame buildings; J-M Transite Asbestos shingles, and containing an interesting chapter on waterproofing. Many illustrations and detail drawings.

### Automatic Elevator Stop.

Safety Elevator Stop Co.,
Kalamazoo, Mich.

Brief description of automatic elevator stop, showing how it operates and how its installation on freight elevators gives added efficiency to the plant. It is claimed for this stop that it solves the elevator danger problem. The slightest contact causes this stop to operate automatically, and its use not only eliminates danger of accidents, but prevents stripping of gears, pulling out and breaking of cables and the destruction of drums, trucks, elevator floors and merchandise. Those interested in safe freight elevators will do well to send for a copy of this booklet.

### Bronze & Copper Entrances.

Newark Cornice & Skylight Works,
15 Seventeenth Ave., Newark, N. J.

Illustrations of a few of the handsome and durable kalamein work in iron, copper and bronze furnished for well known modern buildings by this firm.

### Fire Retardant Windows.

S. H. Pomeroy Co., 296 E. 134th Street,
New York.

"Window Wisdom," the first number of which has been published recently by this company, for free distribution to those who display their wisdom by requesting copies; is a little magazine, to be issued at intervals. It is to be "a periodical of progress, a message from those who know one thing extremely well, to those who knowing other things extremely well, would gladly know more about this particular thing." It is well worth while getting on the list for this publication and the company's handsome illustrated catalogue.

### Guards For Punch Presses.

Kreipe & Reinhardt, 123 Liberty Street,
New York, N. Y.

Folder devoted to the Kreipe Guard for punch presses and drops, for which the makers claim simplicity, reliability, durability and mechanical perfection for preventing injury to operators of punch presses. This guard can be used on any style of press and can be installed by any mechanic.

### Power's Cameragraph 6A.

Nicholas Power Co., 90 Gold Street,
New York.

Illustrated catalogue describing the moving picture machines manufactured by this company which are so largely used all over the world. Their 6A Machine, the latest product of this company, is very fully described. The many improvements in its design and construction are shown, and the reasons for its great efficiency pointed out, as well as its safety devices which make for fire prevention. Contains much data of great interest.

### Safe-Cabinets.

Safe-Cabinet Co., Marietta, Ohio.

Those interested in keeping their books, records, valuable papers, etc., safe from fire will be interested in "Ammunition," a little book that tells the story of the Safe-Cabinet, which affords protection equal to that of the heavy iron safe, yet weighs only about one-third as much as one of equal dimensions and has four times the filing capacity. The records of an interesting fire test of one of the cabinets appear in the book.

### Steelcrete.

The Consolidated Expanded Metal Companies,
101 East 40th St., New York.

Every manufacturer, interested in machine guards, should send for a copy of "Tests," a little book that describes the tests of ductility and quality to which all strands of "Steelcrete" mesh are subjected. Much information on the testing of steel is contained in the publication.

### U. S. G. Products.

United States Gypsum Co.,
205 West Monroe St., Chicago, Ill.

Red Book for architects, contractors, plasterers, builders and others, and a book that should be read by them as there is a lot of helpful information condensed in its pages. U. S. Gypsum cement plaster, wall plaster, wood fibre plaster and other U. S. G. products are treated of by text and illustration, and much intercity data is given concerning Pyrobar for school buildings, hospitals and public and private buildings, defining the economy of use and its fireproof features. This product has been approved by the National Board of Fire Underwriters and has been used in their building by Underwriters' Laboratories, Inc.

# SAFETY ENGINEERING

Vol. 29 MARCH, 1915 No. 3

*ANNOUNCEMENT*—**SAFETY ENGINEERING has assumed the subscription contracts of "Protection Engineering." This magazine is to be sent hereafter to the subscribers of "Protection Engineering," beginning with the March number.**

## *Current Comment and News*

THE "SAFETY FIRST" movement is progressing rapidly. Foremost among important announcements is the news of the formation, at an early date, of a Public Safety Section of the National Safety Council.

Newspapers report safety meetings in many cities. Nearly 3,000 persons assembled in Convention Hall, Rochester, N. Y., to participate in the "Street Safety" rally under the direction of the Safety Council of the Rochester Chamber of Commerce. H. L. Brownell, safety inspector of the Chicago Surface Lines, lectured on "Safety First for the Children," at Tremont Temple, Boston, on March 6. On March 3, 650 persons attended a safety meeting in Utica, N. Y., addressed by Marcus A. Dow, general safety agent of the New York Central Railroad. More than 300 employers and employes were present at a meeting in Rome, N. Y., several days ago to discuss accident prevention. The principal speaker was J. F. Conner, of the United Gas Improvement Company of Philadelphia. Mr. Conner was the guest of the Industrial Council of the Y. M. C. A. at a dinner at the Rome Club, preceding the lecture, attended by twenty-five of the city's principal manufacturers and business men. Dr. Peter M. Hoffman, coroner of Cook county, Illinois, addressed large audiences in Illinois cities early in March on the subject of public safety. Two years ago Dr. Hoffman called together in Chicago a dozen prominent men and women and told them of his plans for forming a public safety commission. Today the Chicago commission has more than 1,000 members.

"Outdoor accidents have materially decreased in Milwaukee," says the Milwaukee *Free Press,* "since the organization of a safety commission a year ago."

The Safety First Federation of America was organized in New York City in February, to engage in educational and legislative work for the prevention of accidents. At the New York meeting four vice-presidents, a secretary and a treasurer were elected. The president is to be chosen later. The next meeting of the Federation is to be held in Detroit in September.

In the most minor of railroad or trolley accidents broken glass has always been the source of countless injuries. "Injured by flying glass" is given as the cause of the largest percentage of the casualties. For years wireglass has been giving entire satisfaction in factory, office buildings, or elsewhere, where there was danger from fire or falling glass. It has proven its worth in skylights, elevator or skylight doors, partitions and in outside windows facing nearby buildings. It will prove just as serviceable in car windows. It may be brought forward, as an argument against using wireglass, that it will be hard to break out of the frame in case that may be necessary, but this objection will be found to be more imaginary than real, as there has been no such difficulty experienced wherever it has been used so far. Steel cars have given such a good account of themselves that the demand has gone up all over the country for railroad companies to equip their passenger

Courtesy New York Tribune.

trains with no other kind of cars. This is a long stride in the right directon. Now let us go a little farther and require that the windows of these steel cars be fitted with wireglass.

Recent reports on the structural conditions and hazards in East St. Louis, Ill., by the engineers of the National Board of Fire Underwriters indicate that the building laws are deficient in some important particulars. The laws relative to explosives and inflammables are meagre and inadequate. In the principal mercantile district weak construction makes serious fires probable, but such fires should not involve more than portions of several blocks, the buildings being low. In the manufacturing district and among groups of warehouses serious fires should not ordinarily affect more than a group of buildings.

According to the latest report on structural conditons and hazards in New Orleans, the report superceding that issued in 1909, the building laws, with some important exceptions, are good and well enforced mainly. The fireproof district and the prohibition of shingle roofs are excellent features Structural conditions are weak mainly, although much improved by the increase of fireproof construction and sprinkler installations. The regulations to govern the hazards of explosives and inflammables do not provide suitable penalties for ciolation. In the congested value district, although a large proportion of the more hazardous occupancies are equipped with reliable sprinkler systems, most of the buildings are of poor type and are defective. The poor structural conditions make serious group fires probable, but good private and public fire-fighting facilities make the probability of fires getting beyond control moderate; however, in many places a fire once well under way could involve considerable sections of the congested value district, but would not extend across Canal street. In the minor mercantile

Photo by International News Service.

**Railroad Accident at Claremont, N. H. In railroad wrecks wireglass windows would prevent many injuries to passengers.**

districts local conflagrations are probable. The wharf and warehouse districts are subject to serious individual or group fires. In the frame residential sections the lack of shingle roofs makes extensive fires improbable.

The building laws of Waltham, Mass., are comprehensive and the enforcement is good, according to the latest report. Wooden shingle roofs are prevalent. The State laws relative to explosives and inflammables are not sufficiently inclusive, but there is good control by the State fire prevention bureau through the local fire department. Overhead light and power wires in the mercantile districts and elsewhere are obstructions. In the mercantile districts the conflagration hazard is moderate; serious group fires are probable. In the manufacturing districts only local fires are probable. Extensive fires are probable in the wood-working district. A lumber yard exposes the compactly built frame shingle-roof dwelling district. The compactly built residential section would be subject to sweeping fires during high winds. The flying-brand hazard is pronounced.

In Watertown, N. Y., the municipal building laws are of little value and are not enforced. The structural conditions are hazardous, according to the latest report. In the principal mercantile district building construction is weak, blocks are large, most of the streets are of moderate width, and high winds are frequent. Fires beyond control, to involve considerable parts of the district, are probable, but the whole district should not be involved, on account of a good fire break. The majority of the manufactured plants are sprinklered, and are not liable to fires. The residential sections have the usual serious hazard of frame dwellings with shingle roofs.

Photo by International News Service.

**Rescue Company No. 1, New York Fire Department. Responding to alarm.**

Twice in the first four days of its existence the Fire Department's new Rescue Company No. 1 demonstrated its efficiency in tackling fires too smoky to be fought effectively by firemen unequipped with special apparatus. "Even so old and experienced a fire fighter as Chief Kenlon," the New York *Evening Sun* comments, "is said to have been amazed at the speed with which the smoke-eaters worked through the fumes to the source of one of the fires and extinguished it. Just 15 minutes

Photo by International News Service.

**Rescue Squad Applying the Pulmotor.**

Photo by International News Service.

**Rescue Company No. 1. Line-up of Men and Equipment.**

after Lieutenant Edwin Hotchkiss and his squad donned their asbestos helmets and plunged into the thick black smoke that filled a cellar at 231 Greene street they climbed out again and reported that the fire was over. Chief Kenlon, whose experience with fires of that character had led him to believe that the trouble was merely starting, had been preparing to turn in a second alarm and would not have been greatly surprised if he had had to turn in a third. In attacking another fire, at 25 Bridge street, Lieutenant Hotchkiss's squad showed itself equally able to work down from the top. Starting on the fifth floor, it progressed downward, story by story, assistance from firemen on the outside of the building being greatly hampered by the tightly closed iron shutters. The gases from the burning stock of herbs and cheeses caused the men not the slightest inconvenience. Further tests of the smoke armor will have to be made before the extension of its use throughout the department can be decided on. If Rescue Company No. 1 lives up to the record it has set for itself, however, this new branch of the service will make good with a rush."

## NATIONAL SAFETY MOVEMENT.

A ladder is one of the most dangerous things in the world.—*A. E. Davidson.*

Two-thirds of the reduction in the number of accidents has been accomplished through organization and education, through teaching the workmen and securing their co-operation. —*C. M. Price.*

A thoroughly organized and drilled private fire department is an invaluable and indispensable aid in a campaign of fire prevention and protection.—*L. A. Phelps.*

Show your employes that safety activity is in their interest and that of the nation. Once they realize this they will say "This business of preventing accidents is my business; I shall attend to it and would like your co-operation."—*Alexander Shane.*

One pail of water can do more good at the beginning of a fire than thousands of pails can do after the fire has been burning three or five minutes, and especially so in a frame dwelling.—*W. C. Kerber.*

The bonus system is a powerful lever in making the foremen apply themselves more diligently and with intenser interest to the prevention of injuries.—*J. B. Ayres.*

The vision of the pioneer in the safety movement has been fulfilled—the employer of today builds on established foundations.—*H. W. Forster.*

The stigma resulting from carelessness clings to the official as well as the men.—*George Shepherd.*

Children are not the only ones who play with fire. We live in houses veneered both inside and out. Looks count more than intrinsic worth.—*Dr. H. C. Campbell.*

A man not confident of his ability to get out of the building in case the fire gets beyond control does not usually make the best of fire fighters.—*J. E. Latta.*

All danger places must be made foolproof if the greatest percentage of accidents is to be eliminated.—*J. D. James.*

# *Fire Prevention in Public School Buildings*

*In the first sixty-eight days of* 1915, *73 fires occurred in public and private schools and colleges. Fifty-four fires were in public schools. There is need for safeguarding the lives of the occupants of public school buildings during school hours and for examination of teachers on the subject of fire prevention.*

THE rules for fire prevention in the public school buildings in the city of New York are the outcome of the work of a special committee, the members of which were Deputy Chief Beggin, who served for many years at the headquarters of the Fire Department, where his duty related to the inspection of buildings as to safety; Battalion Chief Dougherty, an instructor in the Fire College, and Fire Prevention Inspector Francis G. Riley. Frank D. Wilsey, chairman of the Committee on Buildings of the Board of Education, and C. B. J. Snyder, superintendent of school buildings, co-operated with the committee in the preparation of the rules.

Previous to the promulgation of the rules by the Committee on Buildings of the Board of Education, the special committee of the Fire Department conferred with the representatives of the Board of Education on the subject of fire prevention in the public schools, based on these premises:

The necessity of safeguarding the lives of the occupants of the public school buildings during school hours.

The elimination of the physical fire hazard, in so far as it is practicable so to do, in all school structures, particularly those of the non-fireproof type.

The formulation of standard rules, with the view of centralization of responsibility for the enforcement of such rules, particularly in so far as they apply to existing exit arrangements, fire prevention and fire protection, and of preventing contradictory recommendations.

Besides submitting the rules to Fire Commissioner Adamson, the committee recommended that provision be made so that it would be impossible for an operator to proceed with the use of lantern and films in motion picture work without securing a certificate as to his fitness as an operator; that the use of a motion picture machine should not be proceeded with until after the issuance of a certificate that the wiring thereof had been approved by the Department of Water Supply, Gas and Electricity.

Another recommendation was that instructions be issued to the principal and others in charge of a school that the first duty, after receiving information about a fire on the premises, should be to have the building vacated forthwith of all of its occupants and an alarm sent from the fire alarm telegraph boxes. It was the belief of the committee that the divided responsibility that existed for the maintenance of the fire alarm telegraph boxes in the school buildings was a practice fraught with danger to the occupants of the schools.

### REVISED RULES FOR FIRE PREVENTION IN SCHOOL BUILDINGS IN NEW YORK CITY.

1. Each building shall have a sufficient number of fireproof stairways and of exits to permit of its occupants vacating same in not more than three minutes in non-fireproof and not to exceed three and one-half minutes in fireproof structures.

In every case where practicable the floor areas shall be divided by approved fireproof partitions, all openings in which shall be protected by self-closing fireproof doors, and where such provision is made the pupils occupying each side of said partition shall be separately drilled.

2. Means of signaling shall be provided:

City fire-alarm signal box.

Gongs of mechanical, electro-mechanical or electric construction, by means of which the principal may direct rapid dismissal.

Signal stations placed at various parts of the building, by means of which the need for rapid dismissal may be communicated to the principal's office.

Classroom bell system. The extent of the

bell and gong equipment to be regulated by the size and extent of the building.

A means of transmitting signals for dismissal, for use in the event of signal bells or gongs being out of order.

The signals used for dismissals shall be uniform in all schools throughout the city.

Cards bearing rapid-dismissal instructions shall be posted near the exit doors of all rooms used by pupils for study or instruction.

In the event of its being necessary to send in an alarm of fire by means of the fire-alarm telegraph box in the school building, it shall be the duty of the janitor, at the instant when the building has been vacated by pupils and teachers, to at once send in an alarm from the nearest street fire-alarm box.

3. Every building shall have at least two exits, remote from each other.

4. All inside wood stairs to be replaced with those of fireproof material, exception being made in the case of small frame schools in outlying sections, where other ample means of exit are provided.

5. All stairways of all buildings shall be enclosed on each floor with fire- and smoke-proof partitions and doors. All such doors to be self-closing.

6. All stairways to be not less than three feet wide, and not more than six feet wide, without an intermediate handrail.

Note.—The 3-foot width of stairways applies only to those now in position and not to such as may hereafter be constructed, which must be not less than 44 inches wide. The standard width of 4 feet is to be adhered to if possible.

7. Stairway terminals shall be free and clear of any and all obstructions that would interfere with or retard the flow of traffic in any manner.

8. All stairways, landings and passageways leading thereto shall be kept free from all loose furniture or anything that blocks or narrows the exits.

9. All doors opening on stairways should open on platform equal to width of the door.

10. Outside fireproof stairways shall be provided in buildings where present stairways are insufficient or inaccessible and it is found to be impracticable to build an inside fireproof stairway.

11. All terminals of outside stairways to be to the street where possible; otherwise, if to yard or court, there shall be provided proper fireproof exit to street without crowding any exit used for other stairways.

12. Half doors and windows at openings leading to fire escapes shall be replaced wtih doors of at least 6 feet 6 inches in height.

Note.—This refers to conditions at present existing in some of the older school buildings. The form of exit and fire escape are both undesirable and shall not be hereafter embodied in any work.

13. All clothes closets on half-story levels, opening on line of stairway, should be discontinued, unless there should be a separate stairway leading thereto.

14. All ladders leading to roofs shall be of the double-rung type, constructed of iron and braced in a firm and substantial manner. This includes all ladders leading to attics and those to a scuttle or bulkhead.

15. Platforms shall be built in unfloored attics, at location of scuttle ladders, and protected with 2- x 3-inch guard-rail.

16. The stairs and connecting passageways leading from cellar to first story or to playroom on or about the same level as the boiler rooms shall be enclosed in fireproof partitions, at either end of which there shall be fitted a fireproof door, one of which shall be hung on spring hinges or operated with an automatic spring, the other to be a standard firedoor, which, when open, shall be protected by a substantial steel enclosure.

17. All classroom doors to open into the rooms.

All stair doors above first floor or basement where exit is had shall open into the stairway, following the line of flow of the pupils and out at the first door or basement toward the exits.

All exits to open out.

All gates to open out clear, to be provided with locks, and kept open and locked back during school hours.

18. All boiler rooms shall have two means of exit; where below ground level, one to be by means of an iron ladder to an areaway or similar, in accordance with the building code.

19. All cloak and coat rooms now in halls or passageways shall be removed or rearranged to open on interior of classrooms.

20. No clothing shall be hung in the open hall or on a stairway; hooks in halls shall be taken down and provision made elsewhere for hanging clothing.

21. All doors of classrooms shall be kept entirely clear of encroaching furniture. There should be a clear space at each door and all seats that interfere therewith shall be removed. Loose furniture shall be removed from all aisles and passageways, which must be kept clear at all times.

22. Loose sheets of paper shall not be hung on or about classroom doors.

23. Movable chairs must not be used in auditoriums to which the general public is admitted for lectures, etc.

24. Wood doors along the line of exit stairways shall be replaced with doors of fireproof material, provided with self-closing devices.

25. Hooks, where used to hold stairway doors open, shall be replaced with automatic catches or holding devices.

26. All locks and bolts, wherever used on exit doors, shall be operated at least once each week and kept oiled and ready for immediate use at all times.

27. Exit signs shall be provided, as hereinafter indicated, the letters and figures on which shall be not less than four inches

high. All movable signs shall be of substantial material.

28. All doors from assembly rooms and doors from hallways shall be designated by exit signs, numbered on all floors alike, as, for instance, a stairway shall be numbered the same on all floors. After all stairways have been thus numbered, the succeeding numbers may be used for any other exits.

29. In all buildings used as night schools and in all school buildings wherein lectures, etc., are given after school hours or after sunset to the general public, lights with red globes shall be provided over all exit doors and stairways, and outside fire escapes shall be properly illuminated at night.

Note.—This provision for illumination of outside fire escapes refers to conditions in some of the older buildings. It is required, however, that all of the stairways, both inside and outside, together with the exits of a building used for evening school, shall be illuminated while the school is in session.

30. Exit signs shall be placed at all doors leading to street from first floor.

31. Where entrances to stairways through halls or other exits do not permit of exit signs being readily seen, additional sign or signs should be placed and, if necessary, arranged to project from side wall.

32. Doors leading to exit stairways from roofs used for recreation purposes should be provided with regulation exit signs.

33. Half-story rooms, with door openings on line of stairways leading to exits, should have distinguishing mark to prevent such doors being mistaken for exit doors.

34. In schools where lectures or other entertainments are provided for the general public, the exit doors must not be locked at any time while such audience is within the building.

35. Attics and open cellars shall not be used for the storage of furniture, books, lumber, etc. Special provision of a fireproof storage room in cellar or basement shall be made therefor.

36. Pupils' individual desks, wherein pockets (or other receptacles) are provided for books, must be cleared out and kept clean of all unnecessary accumulations of paper, rags, etc.

37. Students' benches and the floors about the same in carpentry classrooms shall be kept clear of all accumulations of sawdust, shavings and litter of all kinds.

38. All closets under stairs shall be removed wherever possible. Those that cannot be removed shall be vacated and kept securely closed against use.

39. Janitor's storerooms, in which supplies, such as oil, waste or paint, are kept, shall be of metal or other fireproof material, with self-closing doors.

All doors, windows and transoms in storerooms shall be of fire-resisting materials.

40. Enclosure of fire-resisting material, with proper vents and self-closing door, shall be provided for storage of oils, etc.

41. Enclosures of fire-resisting material must be provided for storage of sawdust and raffia.

42. A metal box or can, with self-closing top, must be provided, in which new cotton waste shall be kept.

43. Metal receptacles, with automatic-closing covers, shall be provided for all playrooms and lunch-rooms, to receive waste paper and refuse. Each shall be of about the size of the standard ashcan, one can for boys' and one for girls' playroom, for all schools of one thousand or less, and an additional can for every additional five hundred pupils.

44. Fireproof closets, with self-closing doors, shall be provided for storage of paints, oils, etc., in carpentry and other classes where used. These closets must be placed away from exit doors.

45. Unprotected wood enclosures shall not be maintained about boilers, machinery, pumps, coalbins, etc.

46. All brick-enclosed coalbins shall be constructed so as to have an outlet at each end to the outer air, consisting of an eight-inch pipe, so that air may circulate through same.

47. All wood chutes or shafts to be made fireproof.

48. All light shafts shall be constructed of fire-resisting material throughout, or closed up if conditions warrant.

49. All paper chutes shall have iron bars placed across the opening on each floor to prevent persons falling down if door is left open. Doors to have automatic-closing spring attachment.

50. All wood lining under soffits of stairs to be covered with fireproof material.

51. The ceilings of all boiler rooms, cellars and basements, and all wood ceilings of non-fireproof buildings, to be fireproofed either with plaster board covered with 26-gauge metal or other approved material.

52. All attics of non-fireproof buildings shall have at least one approved fire-stop, with an additional stop for all in excess of 5,000 square feet of area or fraction thereof. All doors through same to be fireproof and hung on strong spring hinges.

Partitions to be of plaster board, covered with 26-gauge metal or other approved material.

In large open attics, where subdivisions are already made or provided for, means of access shall be provided to each of such subdivisions from top floors.

A ventilator or skylight shall be installed over each section, in the proportion of 100 square feet to 5,000 square feet floor area, and same shall be protected by wire guards.

53. All frame structures in courtyards shall be removed.

54. Steam or hot-water heating pipes shall not be placed within two inches of any timber or woodwork, unless the same is protected by a metal shield. When so protected, the distance shall not be less than one inch.

55. All steam or hot-water heating pipes

passing through floors and ceilings of lath and plastered partitions shall be protected by a metal tube one inch larger in diameter than the pipe, having a metal cap at the floor, and where they are run in a horizontal direction between a floor and a ceiling, a metal shield shall be placed on the under side of the floor over them, and on the sides of wood beams running parallel with said pipe.

56. All vertical wood boxes or casings protecting the coverings on steam or hot-water heating pipes or piping in which the water contained therein exceeds 200°, F., shall be replaced with metal.

57. All indirect stack enclosures of wood shall be removed and replaced with those of metal as rapidly as possible.

58. All steam coils, radiators or pipes in wardrobes shall be protected by a screen or heavy wire netting so that clothing may not come in contact therewith.

59. All steam radiators or coils in all halls or passageways shall be protected by metal shields. All vertical steam pipes and returns within reach of the pupils shall be covered with insulating material protected by metal.

60. All openings through floors and partitions through which steam or other pipes pass shall be made secure against the passage of fire and smoke by the use of non-combustible materials.

Floor registers shall be protected by a screen of ½-inch mesh galvanized-iron wire, fastened up close to the under side thereof.

61. All gas service mains shall be fitted with a stopcock at or near the curb.

62. The use of swinging gas brackets for any purpose is prohibited. None other than short, stiff brackets shall be used.

All brackets in basements, playrooms, toilets, hallways and stairways shall be fitted with detached keys and all, including those in the cellars, shall be equipped with wire protectors.

63. In cooking classes, where a number of small gas stoves are used, teachers should be cautioned as to the use of matches and pupils instructed as to the proper method of lighting matches, as well as disposition of match-ends after lighting gas.

64. Friction lighters should be used, where possible, in place of matches in classrooms.

65. Proper gas-lighters shall be used for lighting gas in halls.

66. Rubber hose shall not be used for connections for gas ranges or gas stoves; neither for burners, except for laboratory tables.

67. All woodwork at or near gas stoves shall be carefully protected by stone linings or metal lined with asbestos.

68. Gas stoves or hot plates shall not be placed upon a wood-top table or other similar surface, unprotected by stone or metal with asbestos beneath same, or other incombustible materials.

69. Gas ranges shall rest on a base of stone, cement or 26-gauge metal, lined with asbestos ¼ inch thick.

70. All gas-meters shall be provided with fire-resisting platforms or shelves.

71. Combustible material shall not be stored under or near gas meters or electrical meters or switchboards.

72. Pupils must not, under any circumstances, carry matches into school buildings at any time or for any purpose.

73. For ordinary school structures the standard fire-extinguishing appliance equipment shall consist of:

One 3-gal. approved fire-extinguisher.

One 5-lb. flat-head axe.

One 6-ft. hook, Fire Department pattern.

74. Additional fire-extinguishers: One additional extinguisher shall be provided on each floor where classes in carpentry, chemistry, sewing, etc., are located, and in which combustible material of any kind, other than books, is used in connection with school work, and two additional extinguishers shall be provided where such floors cover areas of 10,000 square feet.

One additional extinguisher shall be provided for each assembly room where there is more than one assembly room in a building.

Fire buckets: Two standard fire buckets, 10 quarts capacity, shall be placed in each carpentry classroom.

75. Automatic sprinklers shall be provided in large storerooms or workshops on first floor or below, and in all waste-paper chutes, one being placed at top and one at bottom. All supplies to be from house service.

76. Water connection, with length of small hose attached, shall be placed in all furnace rooms for use about ash pits, and similar connections shall be placed where waste paper or other refuse is burned.

77. An asbestos sheet shall be provided for each class in cooking and chemistry.

78. Oil of any kind shall not be applied to wood floor.

79. Kerosene oil shall not be used for cleaning purposes alone or combined with any other oil or preparatoin.

80. Doors to stair enclosures shall not be fastened back while school is in session.

Submitting the rules, the committee of the Fire Department recommended that suitable action should be taken by the Board of Education to place the following rules into immediate effect:

| Rule No. | Subject Matter in Brief. |
|---|---|
| 2. | Signals in case bells are out of order. Signals uniform in all schools. Rapid-dismissal cards in classrooms. Sending of alarm by janitor. |
| 8. | No loose furniture on stairways. |
| 17. | Gates locked back. |
| 20. | No clothing in halls or on stairs. |
| 21. | Classroom exits to be clear; no loose furniture in classroom aisles. |
| 22. | No loose sheets of paper hung about classroom doors. |
| 23. | No movable chairs in auditoriums. |
| 26. | Bolts to be kept oiled. |
| 34. | Exit doors unlocked during lectures. |

# SCHOOL AND COLLEGE FIRES, 1915

## Cases Selected from Reports to SAFETY ENGINEERING Showing Poor Construction and Lack of Fire Protection

Champaign, Ill. University of Illinois. Girls' society house. Walls wood. Floors wood. Roof shingle. Cause, spark on roof. No private fire apparatus. Twenty-five persons in building, all escaped. Fire escapes on building. Loss $14,000.

Sioux City, Iowa. Morningside College, Conservatory of Music. Walls stone. Floors wood. Roof slate. Fire spread rapidly on account of wood floors, wood partitions, etc. No private fire apparatus. Fire escapes on building. Loss $25,000.

Farmington, Ky. High School. Walls brick. Floors wood. Roof metal. No fire department. Building consumed. No private fire apparatus. Loss $8,000.

Hazel Green, Ky. Christian Women's College. Girls' dormitory. Walls wood. Floors wood. Roof tin on rafters. Cause, furnace. No fire department. No private fire apparatus. Fifty to sixty persons in building, all escaped. Fire escapes on building. Loss in excess of $10,000.

Winslow, Me. High School. Walls wood. Floors wood. Roof shingle. Construction favored fire. Fire department handicapped by lack of horses. No private fire apparatus. Outside fire escapes on building. Loss $17,000.

West Lebanon, Me. Hillside School for boys under 15 years of age. Walls wood. Floors wood. Roof wood. Cause, overheated flue from boiler. No fire department. Neighbors aroused by telephone. Completely destroyed. Nothing to retard fire, no fire stops in floors or walls. Private fire apparatus; hand chemicals. Fifteen persons in building, all escaped. Stairs front and rear, fire escapes outside. Loss $15,000.

West Egremont, Mass. Berkshire Hills School for Boys. Walls wood. Floors wood. Roof shingle. Fire caused by defective chimney. Building completely consumed. Construction favored spread of fire. No fire department. Private fire apparatus; hose but no water pressure. Twelve persons in building, all escaped. Fire escapes on building. Loss $26,000.

Andover, Mass. Phillips Andover Academy. Bartlett Hall, dormitory. Four-story brick building. Floors wood. Roof wood and slate. Cause, overheated fireplace. Construction favored spread of fire. No private fire apparatus. Fifty persons in building, all escaped. Fire escapes on building.

Montevideo, Minn. Windom College. Walls brick. Floors wood. Roof wood. Cause, sparks on roof. Fire department handicapped by lack of pressure. No private fire apparatus. One hundred persons in building, all escaped. Fire escapes on building.

Rochester, N. Y. Trade school. Brick, 3 stories. Cause, spontaneous combustion. No private fire apparatus. Equipped with fire escapes. Loss $300.

Troy, N Y. Public school. Four-story brick building. Floors wood. Roof tin. Construction of building favored spread of fire. Wooden stairway, large main stairway. Fire department detained five to ten minutes by freight train at grade crossing. No private fire apparatus. No one in building at time of fire. Fire escapes on building. Loss $45,000.

Marionville, Pa. Common school. Walls wood. Floors wood. Roof wood. Cause, bursting of a heater on second floor. Alarm by ringing school bell. No private fire apparatus. Fire department handicapped by lack of water, chemical engine out of order. Loss $9,500.

Sherman, Tex. Davy Crockett School. Walls wood. Floors wood. Roof tin. Cause, coal combustion. Spread of fire due to wood in floors. No private fire apparatus. No fire escapes. Loss $50,000.

Edgewood, Tex. Public school. Walls brick. Floors wood. Roof gravel. Cause, stove. Alarm by gunshots, telephone, etc. Construction favored spread of fire. No fire department. No private fire apparatus. Loss $14,000.

Lockney, Tex. Public school. Walls brick. Floors wood. Roof tar and gravel. Building consumed. No private fire apparatus. A new building, contract price $17,000.

35. Furniture, books, etc., not to be stored in attics or cellars.
36. Book boxes of desks to be kept clear of unnecessary papers, etc.
37. Students' benches in carpentry classrooms to be kept clear of sawdust, shavings, etc.
63. Cooking teachers and pupils to be instructed as to use of matches.
64. Friction lighters in place of matches.
65. Gas-lighters for halls.
66. No rubber hose for gas ranges, etc.
68. No gas stoves, etc., on wood-top tables, unless properly protected.
71. Combustible material not to be stored near gas or electric meters or switchboards.
72. Children forbidden to bring matches to school.
77. Asbestos sheets for cooking and chemistry classes.
78. No oil on wood floors.
79. No kerosene oil for cleaning purposes.
80. Stair doors not to be fastened back during school hours.

## FIRE SIGNALS, DRILLS, APPARATUS, ETC.

After the promulgation of the rules for fire prevention in the school buildings, William H. Maxwell, City Superintendent of Schools, conferred with Fire Commissioner Adamson and members of the Committee on Buildings of the Board of Education on the subject of the preparation of a guide to fire protection and drills in the schools. More than 200 teachers and district superintendents submitted suggestions.

The guide was issued on January 28, 1915, in the form of a circular to the principals of all schools; to those who have charge of social and recreation centers and to district and associate superintendents, asking for careful observance of the directions that had been designed to safeguard the lives of those occupying the public school buildings. They were requested to preserve the circular, to note upon it from time to time the dates of the instruction of those under their supervision as to its contents, and to have the notes ready for inspection when called for. The school principals were directed to study the directions and then instruct teachers, making such interpretation as would best secure the efficiency desired.

Superintendent Maxwell's circular:

EARLY PREPARATION.—On the first day of the term and on the first session of a reorganized school the principal should ascertain that teachers, janitor and assistants are capable of giving a satisfactory account of all the duties required of them by this circular. Actual tests of their duties in a fire drill should be made within the next few hours. There is no more imperative requirement when teachers and pupils come newly to a building than an efficient fire drill.

FIRE DRILL.—The term as used in this circular means any immediate dismissal from the building following the three-ring signal. Distinctions as to dismissal with or without street wraps are not contemplated in this designation.

FREQUENCY.—Exclusive of rapid dismissals at the close of a school session, fire drills should be conducted at least as often as once a fortnight.

VARIETY.—Drills should be given under varying circumstances and at varying hours. For example:

a. While the school is assembled in whole or in part;
b. During any one of the recesses;
c. While all the pupils are engaged in the regular class exercises;
d. When one or more of the exits may be supposed to be blocked;
e. Where the peril may be assumed to be imminent to a particular part of the school.

JANITORS.—Janitors and their assistants should be assigned specific duties and stations; as fastening the doors open, protecting the children from trucks, automobiles, etc., in the street.

DOORS.—Principals should see that the doors of all exits are so arranged as to be easily opened from the inside at all times during the occupancy of the building. It is not sufficient that only one-half of the door be ready for use and the other half bolted; both doors should be easily openable during school hours.

SIGNALS.—Three bells, or three rings, three separate pushes of the signalling button with distinctly perceptible pauses, mean "immediate fire drill, pupils go to the street in charge of teachers without delay for books, wraps or for other cause." (The various modifications invented for different circumstances in different schools have been carefully considered. Such as are deemed necessary must not interfere with the regular use of this standard, quick marching fire drill signal.)

"BREAK-GLASS" SIGNALS.—This device for danger signaling from various stations in the building is now available in the majority of the schools. It rings a warning near the station at which the signal for fire drill is to be given. It is proposed by the Fire Department to cut out the warning signal and to connect the boxes directly with the gongs or bells giving the fire-drill signal. Until that change is made principals should continue to see that the drop on the signal bell is vertical when the bell is not in operation. When a button behind the glass is pressed, the drop on the bell near the station from which the fire drill signal is given, should drop, permitting the bell to be rung continuously. As soon as pos-

County ..... School District No. .....

Director of School Board .....

Address .....

How many lessons, approximately, have you presented on the subject of Fire Prevention since September, 1914?

Give number of pupils from 5th to 9th grade, inclusive

Name of teacher

School address ..... Home address .....

Tear off on this line and return with papers to Harrison Parkman, State Fire Marshal, Topeka, Kansas.

## FIRE PREVENTION QUESTIONS

*(To be given in each school March 18.)*

Answers should be written on paper 8½ by 11 inches in size. DO NOT fold or grade the papers but send them rolled or flat, not later than April 1, to

HARRISON PARKMAN, State Fire Marshal, Topeka, Kansas.

### GRADES EIGHT AND NINE AND HIGH SCHOOL

1 (*a*) Mention three substances in which fires caused by spontaneous combustion frequently occur.
(*b*) What chemical action takes place in spontaneous combustion?
(*c*) Suggest some way to lessen fires from spontaneous combustion in coal stored in basements.

2. What causes an electrical short circuit? Explain how buildings catch fire from this cause.
3. What is arson and what is the penalty?
4. Why will the study of Fire Prevention lessen fire loss?
5. What fire protection can be used for homes in the country and in towns where there is no fire department?
6. Give ten fire causes due to personal carelessness.
7 What is the relation between the study of Fire Prevention and the conservation of the natural resources of the country?
8. Write a composition, not to exceed one hundred words in length, on the causes and prevention of fires in chimneys and flues.

### GRADES FIVE, SIX AND SEVEN

1 Give five rules for the safe handling and use of gasoline.
2. Mention three causes of fires in barns and tell how such fires may be avoided.
3. Give three reasons why the safety match should be used rather than the common or parlor match.
4. Tell how you would put out the flames in case your own clothing or that of another should catch fire.
5. What are the principal dangers of bonfires?
6. Write a composition, not to exceed fifty words, on the danger from the careless use of kerosene.

### GRADES THREE AND FOUR

Write ten sentences telling what you have learned during the past school year about preventing fires.

**The foregoing examination questions have been sent to all school teachers in Kansas. The result of the examination will appear in a special report by Fire Marshal Harrison Parkman, to be issued as soon as the papers have been gone over.**

sible after this bell begins to ring, the drop should be pushed to a vertical position, shutting off the electric current and saving the batteries. After the proposed alterations have been made, regular fire drill signals can be given from any of the push buttons behind the glass.

SIGNAL APPARATUS ACCESSIBLE.—The regulations of the Committee on Buildings forbid locking, while classes, day or night, are in the building, rooms containing the means of giving the fire-drill signals.

LOCATION OF SIGNALS.—It is a good plan to have neat, durable signs in suitable places indicating by arrow or otherwise location of the fire-drill signal apparatus.

SIGNALS IF APPARATUS IS OUT OF ORDER.—Principals should devise effective substitutes for the electric signal apparatus in case it fails to work properly (hand bells, messengers with cards or other arrangements); and should keep, by practice, such alternatives up to efficient operation.

INSTRUCTION IN GIVING SIGNALS.—The principal should assure himself that all the teachers and the janitor and his assistants are able to reach and to operate properly the fire-drill signal apparatus. Cards of instruction posted in each classroom are recommended, directing that upon discovery of the fire, notice should be sent immediately to the place designated for sounding the fire-drill signals, and that a messenger at the same time be sent to the principal with the information that there is a fire in the building.

SIGNAL BY OFFICIALS.—It is my opinion that inspection of a fire-drill by persons not members of the organization of any particular school may be obtained with sufficient facility by applying to the principal or to his authorized representative. With this view I have asked those whose duties include the inspection of fire drills to consider that the sounding of a fire-drill signal by an outsider may involve inconveniences like breaking up an examination, repeating a drill just given, etc., so that the loss is greater than can be justified. I have hopes that the readiness of every principal to assist such officials in the discharge of their duties will secure to each school the courtesy of application to its proper representative. It should, however, be thoroughly understood that upon receipt of a signal from the fire-alarm signal station the dismissal signal is to be given at once as if there were an actual fire. Principals are to provide for this procedure.

TESTING APPARATUS.—The Superintendent of Buildings and the Fire Commissioner desire that the fire-drill signal apparatus shall be tested every morning prior to the occupation of the building by pupils and teachers. Principals should obtain from the janitors daily written reports upon the condition of this apparatus. In case it is out of order, written report of the nature of the defect should be communicated without delay to the Deputy Building Superintendent for the Borough. In testing the buttons in closed boxes, do not break the glass, use the key.

SIGNAL TO FIRE DEPARTMENT.—The principal should ascertain that teachers, janitors and assistants know the location of the signal box and how to operate it. This apparatus is tested by the Fire Department; not by representatives of the Department of Education.

CONTROL.—Every fire drill should be, for principal and teacher, an exercise in school management. Complete control of a class so that the teacher may form its ranks quickly and silently, may halt it, turn it, direct it, as she wishes, is the chief purpose of the drill. The signal is for the teacher. From start to finish, the class should be under her direction. Running, breaking of ranks, talking by pupils, are unnecessary. The teacher need not lead the line or follow in the rear. She should be wherever she can best control.

SPEED.—The pressure brought upon us for rapid egress should not effect a loss of the more desirable purpose of safety first. Loss of life in crowded buildings almost invariably comes from lack of control. Running, especially on the stairs, increases liability to falls and to impairment of a teacher's command of class. Most of our buildings can be emptied in three minutes without running. The time lost is usually between the sounding of the signal and the start of the slowest class.

WRAPS, BOOKS, ETC.—In this climate it is almost always possible to select some day every fortnight when the brief excursion to the open air involved in a fire drill can be made without danger. If such a day cannot be found in any particular period, it is a simple matter for the principal to have the children put on their street clothing before the fire drill signal is given. Books in a fire drill are likely to be dropped. The children stoop to pick them up. Retardation, and possibly danger, results.

LINES.—Out-marching lines should not intersect or take unnatural or circuitous routes.

ALL OUT.—Provision should be made for an inspection of each floor to see that no persons are left in the building.

SPECIAL CASES.—Principals should see that teachers give special care to children physically incapacitated.

TO THE STREET.—A fire drill should be a simple, safe and speedy egress to the street. Basements, auditoriums, covered playgrounds and other places not in direct line of exit when used as termini accustom the pupils to action inconsistent with requirements in case of real perils and, should speedy dismissal from these places be necessary, the danger of panic is too great. After reaching the street the pupils should be halted at such points as will permit the approach of fire engines and the use of street hydrants. There should be ample space before all the street doors of the building.

STREET TRAFFIC.—The principals who have monitors instructed to run with printed signals "Fire Drill. Please stop," or with red flags, to the intersections of the streets which lead to the building, set a good example for all. Teachers and janitors should be instructed to prevent vehicles from driving

through the lines. A municipal ordinance makes it a misdemeanor to interfere with a fire drill. Means of identifying offenders together with the names and addresses of witnesses should be reported to the principal.

GOING HOME.—Only in case of actual fire or danger or when a rapid dismissal occurs at the regular close of a session should the children be sent home.

INSPECTION OF FIRE DRILL.—The principal with what assistants he chooses should study his fire drills, locating the responsibility for special excellence or deficiency in control, marching, posture, promptness, etc., and should in subsequent conference give such commendations and corrections as are likely to repair errors and increase efficiency.

CLASS DRILL.—Teachers should be encouraged to use regular dismissals and passage of classes to assemblies, etc., as exercises in the promptness, control, etc., requisite in a superior fire drill. The principal should test teachers in such parts of the drill as can be done without encroaching upon other school work of as much importance. Special mention of particular classes for excellence in fire drill is advantageous.

POSTURE.—A fire drill, and especially the return, is an excellent occasion for practice of the habits of good posture in standing and walking emphasized in the schools. "Stand tall." The school is on parade and should show to best advantage.

NOON RECESS.—Principals should make regulations for emergency dismissals during noon recesses.

REPORT.—On each monthly report the principal is to record date, hour and duration (minutes and seconds) of fire drill.

FIRE EXTINGUISHING APPARATUS.—The principal should as often as is necessary ascertain that the teachers, janitor and assistants know where the fire extinguisher, hooks, axes, etc., are and how to use them. The use of hooks and axes is restricted to the janitor and assistants. The first duty in case of fire, is sending the alarm to the station in the office from which the fire-drill signal is given.

TWO SCHOOLS IN ONE BUILDING.—In buildings containing more than one school, the district superintendent will designate the principal or acting principal who is to have general direction of the dismissal exercises. In such buildings simultaneous rapid dismissals of both schools should be held with sufficient frequency to insure the rapid and safe exit of all.

INFLAMMABLES.—Accumulations of scrap paper or other waste combustible material must not be allowed in any part of the building. Stores of supplies that are combustible should be made inaccessible to all unauthorized persons. No inflammable material should be placed on or near any fixture used for gas or electric lighting.

ASSEMBLAGES.—1. On the day before your closing exercises, or any public entertainment engaging your pupils, have a rapid dismissal drill, the children starting from the positions they will occupy at the public exercises.

2. Do not allow anyone to stand or sit in passageways or exits, except persons detailed as guards. This rule should be observed even if the audience is thereby limited.

3. After the people are assembled have their attention called to the exits and to the necessity of unexcited egress in case of emergency.

4. Apply to the nearest police station to have two policemen detailed to your school during the exercises.

EXCELLENCE.—Most of the schools observe most of the features enumerated above, but there is not one of these details mentioned that has not been neglected by one or more schools since September, 1914. It is evident that one child killed or maimed in a fire drill would bring a sorrow and remorse to avoid which the most strict and detailed regulations governing this serious school exercise are worth all the trouble they entail. There are few single duties more indicative of able schoolmastery than that of maintaining in a large organization a prompt and orderly fire drill.

DISTRICT SUPERINTENDENTS.—On visiting schools, whenever practicable, District Superintendents should witness fire drills and comment to the principals upon them with respect to quality of control, promptness, form, posture and provision for safety. District Superintendents should call for this circular, examine the entries upon it and write their comments.

## FIREMEN'S LADDERS.

The serious injury to two members of the Manchester (N. H.) fire department, reported as one of the incidents of a recent fire, should have been avoided, and would have been had the slogan of "Safety First" been followed. The Manchester *Mirror,* a staunch advocate of safety habits, remarks: "It appears that the necessity of ladder service was apparent and a ladder being planted against the wall of the burning building, two of the firemen mounted it and when they had attained a height of 20 feet or more the ladder, which had been insecurely placed, slipped at the bottom and fell with its human freight into the street, painfully if not fatally injuring both men. The *Mirror* maintains that this accident was one which might have been avoided by the application of the mandates of the slogan of 'Safety First.' Had care been taken in placing the ladder, or had it been guarded by others, there would have been no need of chronicling the accident. This should prove an experience and a lesson that will be heeded and profited by in future."

# ROUGH HANDLING OF EXPLOSIVES

ONE of the regulations of the Interstate Commerce Commission and the condensed rules on the commission's placard for explosives require the careful handling of cars that contain explosives. The cars must be coupled carefully and all unnecessary shocks must be avoided; other cars must not be cut off and allowed to strike a car that contains explosives.

In spite of the regulations, a car of high explosives was handled roughly a short time ago and 37 cases of dynamite were damaged so badly that new cases were required for repacking. Three other cases were demolished and the contents scattered over the floor of the car. One of the ends of the car was pushed out about two inches at the floor line. The accompanying illustration shows the appearance of a part of the inside of the car.

Giving the information in a bulletin for general distribution, Chief Inspector Dunn, of the Bureau of Explosives, New York City, said: "Train crews should realize their individual responsibility under the Federal law, which provides severe penalties for violations. They should realize also that they are not only endangering their own lives, but the lives of their fellow employes and the community through which their trains pass by such improper and careless handling of cars of explosives. The chances for a disastrous explosion were very favorable in this instance."

Other instances of careless and rough handling:

Because a brakeman failed to adjust a switch for a back track, the forward trucks of a car that contained 123 cases (6,532 pounds) of dynamite followed the engine and the rear trucks took the switch to the back track. The car was derailed by striking the frog and was

**Condition of cases of high explosives after the rough handling of a freight car.**

dragged 200 feet. It sideswiped an empty car on the back track. The car of explosives burst into flames, but an explosion did not occur. Fire was communicated to another car before the switching crew pulled away the two cars coupled to the car of explosives. About two dozen small explosions occurred during the progress of the fire, that was extinguished without difficulty.

When a trunk was taken from the baggage car of a passenger train to a baggage truck, something in the trunk exploded. Several trainmen were injured. In the trunk were blasting caps, dynamite, two shot guns (one loaded) and some ammunition. The indications were that the loaded shot gun was discharged by the shock incident to the pulling of the trunk out of the car, thereby exploding the dynamite.

A box, containing 40 cartons of toy torpedoes, was placed on the floor of a freight car by a truckman. Immediately after the man turned toward the doorway to get another load an explosion occurred in the box.

When a sack of baggage was transferred from one passenger train to another a revolver, which was concealed in the sack, was discharged. The bullet struck one of the baggage agent's legs.

A car that contained, besides other acids in carboys and drums, 12 drums of mixed acid was discovered on fire two days after arrival on a classification track of a railroad yard. The mixed acid had leaked out and set fire to the car.

A shoe company loaded two unprotected 5-gallon cans of leather cement on a car at the factory, with a load of shoes. The car, without placards, was moved from the factory siding to a transfer platform, and when the car was opened at the platform in the course of the night several of the cases of shoes were found tipped over at one end of the car and the two cans, tipped over, at the other end. One of the cans was nearly empty, the contents having leaked out, because the screw top cover had fallen off. An employe went into the car and placed a lantern about two feet from the liquid. An explosion occurred. Twenty-three box cars and about one-half of the transfer platform were destroyed before the fire was under control.

A car that contained a varnish removing compound in wooden barrels and boxed cans was discovered on fire while in transit. Investigation developed that the car was in poor condition, with holes in the floor. The belief was that the fire originated from a hot journal, the flames extending through the holes to the interior of the car.

Because a door of a freight car was defective, a barrel of Japan drier fell to the ground in switching operations. The barrel was broken, and the contents ran out. An employe in the freight office noticed the barrel near the track and lit a match to see what it was. The vapors caught fire; the man's face was burned.

A cylinder of compressed oxygen gas, that had been placed outside of an express office, exploded. The express employes were knocked down, and one was injured seriously by fragments that tore away parts of one of his legs.

Because a yard clerk made an error, a tank car, that contained gasoline and had a placard marked "Inflammable," was placed for water service. In the night time water was turned into the car. The gasoline was forced out, and the vapors were ignited by the flame of a lantern on the end sill of the car. Three employes were burned; one employe died afterward.

Garage employes were draining gasoline from the tank of an automobile in a freight car when the vapors were ignited by a lighted lantern. The freight car and the automobile were damaged by fire.

While a train was in motion a colored brakeman, with a cigarette in his mouth, went to the dome of a car that had contained gasoline. Evidently he leaned over the dome and struck a match to light the cigarette. As the dome of the tank was open, the match ignited the vapor that issued from the tank. The vapor exploded and the man was killed instantly.

A car of gasoline, with the dome cover off, was moved by a drill engine. When a switchman went to the running board near the top of the tank to let off the brake, vapors were ignited by his lantern. The brakeman's face was burned. The handling of the car with the dome cover

off was a serious violation of regulations.

A brakeman got into a tank car that had contained gasoline. Another brakeman, hearing the movements of someone in the tank, held a lighted lantern down the man-hole. Vapors were ignited. An explosion killed the man in the tank and burned the man that held the lantern.

For express transportation several packages and a trunk were accepted by a railroad agent from an exhibitor of motion pictures. One of the packages was a fiber case that contained seven reels of motion picture films. In the night time the railroad station was discovered on fire, flames having started near the case of films. The station and a general store were destroyed by the fire. An investigation indicated that the films had been placed about four feet from a heated stove.

## NEW YORK'S RESCUE COMPANY.

An order by Fire Commissioner Adamson, New York City, issued in January, directed the formation of Rescue Company No. 1, to consist of one captain, one lieutenant and 8 men, to be located at No. 42 Great Jones street, Manhattan, equipped with the following apparatus: Smoke helmets, oxygen tanks, pulmotors, life lines, gun, etc.

The company is to respond to all second alarms in that part of the borough of Manhattan south of a line drawn through 59th street from the East River to the North River; and to all third alarms south of a line drawn through 125th street from the East River to Manhattan street to the North River, and on special call wherever needed. The signal 2-2-2 in conjunction with the station and company number shall signify a call for the services of the company. Example: 2-2-2—459—1, signifies a call for Rescue Company No. 1 to Station 459, Broadway and 34th street. In addition to the rescue work the company is to be used for the purpose of ventilating and fire fighting in places heavily charged with smoke or gas.

At eight o'clock a. m. on Monday, March 8, the new company was placed in commission and was ready to respond to fires in compliance with the order promulgated in January. Chief Kenlon issued the following orders:

Chief officers are hereby notified that sound judgment and discretion must at all times be used in directing the operations of this company; they will consult with, and furnish all possible information with regard to the location of the fire and such other conditions and circumstances as may come to their knowledge, to the officer in charge of the rescue company, and if, after an examination of the premises on fire or the conditions and surroundings of such fire, the officer in charge of the rescue company is of the opinion that it is unsafe for himself or his men to attempt entrance, the chief officer in charge will be guided by such opinion and shall not insist on forcing the company to go in places where, in the judgment of the officer in command of the company, it is extra hazardous, or impossible to make headway.

I am of the opinion that the addition of this company and its equipment to the fire department, will, if operated with care and discretion, prove a decided advance in the science of fire fighting, and I expect sound judgment and discretion on the part of subordinate chief officers who may be in command at fires in directing its operation.

The full equipment of Rescue Company No. 1, as reported to SAFETY ENGINEERING, is as follows:

2 Pulmotors,
2 Hand searchlights,
2 Stretchers,
2 Jimmies,
2 Telephone helmets,
8 Helmets,
1 Breathing bag with apron and straps,
2 Hand extinguishers,

Rubber gloves for each member of crew.

Tools, including pliers, wrenches, crowbars, door opener, acetylene-oxygen cutting outfit, life-line gun, line and canister, axes, etc.

Almost immediately the new company was called into service. Its work has been valuable and other rescue companies are planned.

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As soon as the public is educated to the necessity of fire prevention, the fire-resistive building will appeal to them.—*Ivan C. H. Young.*

Build so that destruction cannot occur. Fire prevention is the only *real* insurance, the other is only make-believe.—*L. S. Hotchkiss.*

# FIRE PREVENTION IN THEATERS

*By Lieutenant John J. T. Waldron, in Charge of Division of Places of Public Assembly, Fire Department, New York City.*

WHILE the subject given me to discuss has been entitled "Fire Prevention in Theaters," in the administration of the division of which I am in charge, the fire and panic hazards in these places being so closely related, they having always been treated in connection with each other, it would hardly be proper to discuss them separately, and a better title for this paper would be "Fire and Panic Prevention in Theaters."

Fire and panic prevention in public places may be divided under three headings: First, proper designs, construction and equipment; second, proper inspection and supervision; third, sane and thoughtful management.

As to design, construction and equipment: This is the work of framers of law, and we have been fortunate in that, framers of past building codes realizing that the American temperament demands, as a tonic against physical and mental stagnation, considerable amusement and instruction, and such amusement and instruction are sought in theaters, and, while general provisions for various other structures have been made, a specific section treating theater construction and equipment in detail has always been provided for by the New York Building Code.

A theater stage is practically a fireplace of the open hearth kind, and, if properly constructed, the walls carried up to a sufficient height, sufficient ventilation provided over same, a fire the width of the proscenium opening might be built while the audience looked on in perfect safety.

The principal fire hazard being upon the stage, the design for safety should provide the following: First, sure and sufficient ventilation over stage; second, a proper fireproof curtain, arranged to drop automatically in case of fire, to protect the proscenium opening; third, automatic sprinklers to cover every square foot of stage, dressing rooms, carpenter shop, etc.; fourth, dressing rooms to be on stage side of proscenium wall, separated from stage by fireproof partitions; fifth, all scenery to be fireproof; sixth, a proper equipment of auxiliary fire appliances, such as standpipes, extinguishers, hooks, axes, etc.; seventh, electric wiring to be installed under the best known methods.

Section 109 of the present building code requires an automatic sprinkler equipment to be placed over and under the stage, in dressing rooms, carpenter shop, paint rooms, store rooms and property rooms, the system to be supplied from a gravity tank of not less than 5,000 gallons capacity; it also requires a standpipe system, consisting of a 4-inch riser on each side of the auditorium and on each side of the stage, with an outlet, a valve and sufficient hose on each floor, tier, and gallery. The standpipe must be supplied by an automatic fire pump of at least 250 gallons per minute capacity, driven by a 25 horse-power motor, the pump to be supplied from a suction tank of at least 5,000 gallons capacity connected direct to street main, and there shall be a gravity tank, on the roof, of at least 3,500 gallons capacity, and a two-way three-inch outside fire department connection on this system.

While the general provisions of Section 109, which was adopted in 1899 and amended in 1906, are basically correct, later experience has shown a possibility of improvement, and as a personal suggestion I cite these instances:

The present code provides that automatic skylights at least one-eighth the area of the stage shall be provided over same "said skylight to open on the burning or cutting of a hempen cord," and, as the purpose is to provide ventilation in case of fire, it would be better to eliminate the word "skylight" and provide for automatic ventilators, there being several types of ventilators designed for this purpose, and the word ventilator is self-explanatory; the old type of inclined sliding skylights is subject to many causes which may render them inoperative, such as, snow, ice, ignorant stage help, to prevent

draughts sealing same with wood or canvas, and despite continual inspection, the operation in case of necessity is always problematical. In view of the fact that fusible links are used universally on releasing devices for doors, etc., the hempen cord to be burned or cut should be eliminated and fusible links be placed on ventilator control. The wire netting required by the present code underneath the skylight is a positive menace, which may become clogged by the upward draught when skylights are opened, and if a protection is needed it should be placed two feet above the skylight.

The code provision for a curtain should provide for a better and more specific form of construction. The curtain should be of sheet steel on auditorium side and asbestos block lining on stage side, with an air space of not less than four inches between steel and asbestos.

The provision as to space between rows of seats, at present to be not less than 32 inches from back to back, should specify also that seats shall rise automatically and that arm rests or separators be not more than 12 inches in length, as the present lack of this regulation in some cases leaves a rather small space for persons to pass through to reach aisles. As it is difficult to regulate or control persons standing, standees should be prohibited in all theaters during performances.

As to inspection and supervision: An idea of the responsibility that is charged to the Division of Places of Public Assembly may be had from the following summary of licensed places of public assembly in New York City:

Theaters, 200; seating capacity, 278,255.

Motion picture theaters, 951; seating capacity, 434,429.

Dance halls, 791; capacity, 164,058.

During the year of 1914, the inspection force made 2,446 inspections for licenses, and 28,168 reinspections to see that the conditions reported prior to the issuance of license were maintained and to ascertain whether any violations had developed and that the law was being complied with. In every theater in which there is a stage, with scenery and dressing rooms, a uniformed fireman is detailed during a performance to see that all appliances are in working order and that all exits are available for use. Officers of the rank of lieutenant, designated as theater inspectors, supervise the work of these men, visiting the theaters to see that the men on duty are performing their duties properly and to take care of any extraordinary occurrences the detailed firemen cannot control. The theater inspectors also visit theaters between the performances, test the pumps, go over the standpipe lines, tanks, and see that the scenery and decorations are fireproofed properly.

The list of attributable fire hazards that the inspectors guard against particularly are the use of inflammable decorations, the use of open flames, such as candles and lamps, either in dressing rooms or on the stage, smoking, excessive storage of scenery, and when the inspectors find these conditions they are abated by the inspector before a performance can be given. Relative to scenery, I might invite attention to an odd Fire Department definition of same; that is, "all excess and non-fireproof scenery is classified as rubbish," and considerable trouble is found in theaters of the stock company type, in that the scenery of the current performance is on the stage while last week's set, or possibly that of future performances, may be placed in the building, and when such conditions are found orders are given immediately to have the excess scenery removed.

In dealing with the panic hazard the policy pursued to minimize same is to provide a sufficient number of aisles, passageways, exits, courts and fire escapes, and to compel proper maintenance of same; all seats are made stationary: all locks and fastenings are removed from exit doors and approved panic bolts installed; sufficient inside and outside exit lights are provided at all portions of the building used by an audience.

Dance halls, sporting clubs and exhibition buildings, being within the jurisdiction of this division, are made subject to inspection and supervision, and the same general precautions are applied to these places, there being a prohibition against the use of inflammable decorations, especially against the use of serpentine paper,

confetti used at some dances, and unless these materials have been subjected to a fireproofing process, the inspectors would stop their use.

As to the duty of the management of theaters: The policy of this division has been to keep in constant touch with the persons responsible in all public places, to compel compliance with the regulations, not because the law requires certain things to be done, but because of the direct personal responsibility for the safety of the audiences which equally rests upon the manager as upon the Fire Department. Every manager has printed upon a programme a fire notice and a diagram showing all exits, the fire notice requesting the patrons to notice the exits and to use the most available one nearest exit in case of emergency.

An attempt was made some time ago to drill an audience to use all exits, but it is a rather difficult thing to accomplish, as was shown by the test. At the conclusion of the performance all exit doors were thrown open and the audience left the building, using all exits, including those on the sides of the side courts, but after leaving the building and finding that the side courts led to a rear street they returned into the building and out through the front doorway. Car lines and carriage stands are usually on the main street, and despite attempts to accustom persons to use emergency exits, they apparently resent the suggestion and persist in choosing their own way. Complaints have been received that the sudden throwing open of all exits chills the house, and the ladies waiting to enter the cloak room to get their outer garments become ill.

The managers of the theaters, however, should drill the employes to be on the alert to avert a panic, to extinguish a fire, if one occurs, and to throw open all exit doors in case of necessity. They should also pay particular attention to prevent the accumulation of rubbish, to prevent smoking back-stage and in dressing rooms, keep all advertising signs and pictures out of the lobby and, if the unforeseen should occur, their efforts will be more than repaid in that the safety of the audience is assured.

The policy of this division is to compel strict compliance with every law, ordinance, rule and regulation before an approval of license for a place of public assembly can be obtained, and to compel a strict compliance with the requirements under which the license is issued, and in all cases to direct an immediate action in case of non-compliance.

## HAZARDS IN PAINTING.

The keeping of paints, painting materials and rags wet with oil or turpentine inside of a house is simple foolhardiness, an invitation to disaster, said the Boston *Herald*, commenting on the fire in the Cambridge City Home.

Linseed oil, which is used in practically all paints, oxidizes on exposure to the air; in other words, it undergoes a slow combustion, which produces heat. When this heat is confined in a bunch of oil-soaked rags or waste it often reaches the point of producing flame. All vegetable oils behave in the same way, with more or less energy. The danger in rags wet with linseed oil or turpentine is an old story to all fire insurance men. It ought to be one of the commonplaces of fire precaution known to everyone. Yet a Boston man of science some years ago barely escaped with his life from his own house because painters had left oily rags under the front staircase. He knew the rags had been left there, but he did not know, he said, that they were dangerous. This is the time for everyone to overhaul his home repair supplies, and to resolve that every paint rag shall go out of doors as soon as its immediate use has ceased.

From the point of view of public authority, the Cambridge fire might well justify the State fire prevention commissioner in laying down the rule that no painting materials should be stored, even over night, in any public building used for sleeping quarters. This matter of paints and rags is too old a blunder to be longer tolerated. That the Cambridge institution should have had a paint room under the same roof with 300 sleeping inmates is highly discreditable.

Through co-operation with the teachers, arrangements should be made to train pupils to recognize fire dangers.—*Ivan C. H. Young.*

Photo by International News Service.

**STEAMSHIP RE d'ITALIA.**

**(Top) Firemen directing hose stream into the hold. (Bottom) Firemen directing hose stream on burning bale of cotton.**

## FIRE ON ITALIAN STEAMSHIP

Fire in hold No. 1 of the Lloyd Sabano steamship *Re d'Italia,* that contained 1,400 bales of cotton and many cases of lubricating oil, burst forth just before the steamship was ready to leave the pier at Grand street, Jersey City, on February 16 last. Two hundred Italian steerage passengers became panic stricken before they were sent to the pier. The Jersey City fire department and the New York City fireboats, that were called to assist, fought the flames two hours before the fire was under control. The fire was a spectacle for occupants of skyscraper buildings on the water front. Fires on shipboard are now controlled by automatic sprinklers—if the ship owners are up-to-date in efforts to protect valuable property.

## FIRES FROM SUN'S RAYS.

In a field near Oak Hill, Kansas, two stacks of wheat burned without an apparent cause. An investigation developed that the fire, undoubtedly, was caused by the sun's rays being condensed and deflected by a piece of glass lying on the ground. In another case a State fire marshal made this statement: "I believe the rays of sunlight became focused at a point on the curtains, the bulb (the defect in the glass) acting as a lens."

# HAZARD OF MOTION PICTURE FILMS

COMMISSIONER ADAMSON, of the New York Fire Department, has forwarded to the General Welfare Committee of the Board of Alderman a proposed ordinance to prohibit the carrying of motion picture films in subway railroad cars; also to prohibit the carrying of the films in elevated and surface railroad cars, unless enclosed in metal boxes, with tight fitting covers, like those prescribed by the Interstate Commerce Commission for the transportation of films.

The fire commissioner mentioned the disastrous fire in a suburban train in Chicago on November 24, 1914, when 38 persons were burned by the flames of motion picture films. He said: "Motion picture films should be kept out of the subway and carried only in the elevated and surface cars when they are in metal cans. Everyone knows the inflammable character of these films."

Previous to the drafting of the proposed ordinance the fire commissioner issued this order:

**No person shall transport inflammable motion picture films in any street car, subway or elevated line, omnibus, ferryboat, or other public conveyance, or carry the same into any railway station, subway station or ferryhouse, unless each of such films shall be enclosed in a suitable metal box, with a tight fitting cover, and not more than ten films so enclosed shall be carried at any one time by any person.**

A special bulletin of the Bureau of Explosives in New York City gave particulars of the fire in one of the cars of a suburban train in Chicago on November 24, 1914.

A passenger carried into the combination smoking and baggage car a paper-wrapped package that contained four reels of motion picture films for use in an exhibition at a suburban clubhouse. The package was placed on the floor between two seats near the center of the car. About four minutes after the train left the Chicago station a puff of smoke arose from the package, which was followed instantly by the burst of flames. Passengers in front of the flames rushed to the doorway of the baggage compartment and, in opening the door, let in a draught that caused a rapid spread of the fire. The train was stopped, but before the passengers could get out of the car 38 were burned; two died subsequently.

The person who had the films was taken to a hospital, suffering from burns, but was discharged the next day.

Evidently the films were ignited by a lighted match, cigar, or cigarette. They were not packed properly as required by the Federal regulations for express shipments. The wrapping facilitated ignition and served to conceal the contents of the package.

The accident emphasized a serious menace to life in a widely prevalent practice. It has been estimated that more than 7,000 messengers travel over the railroads to circulate the films that are not sent by express. Some progress has been made, for express shipments, in bringing the security of packing up to the standard set by the Federal regulations. When a defective package is offered to the express company it is subject to inspection and rejection. The railways, however, cannot prevent the inclusion of dangerous articles in hand or checked baggage.

The composition of the base of the films differs only slightly from that of smokeless powder. Unless confined strongly there is no danger of a violent explosion, but the fire hazard is a sufficiently serious menace to life. Dealers in motion picture films should realize that the education necessary to make effective any law or regulation for the safe transportation of the product can be, and should be, accomplished by them.

The regulation prescribed by the Interstate Commerce Commission for shipments by express is:

**43(a). Motion picture films must be packed in tightly closed metal cases inclosed in a strong, spark-proof wooden box; or in spark-proof cases made of sheet iron not less than 0.02 inch thick (No. 25 U. S. standard gauge) and lined throughout with fiber board at least ⅛ inch thick, or some equivalent insulating material. The covers of these cases must fit tightly and must lap over the body at least ⅝ inch on the sides, forming a tight joint.**

**Note.—Strong spark-proof vulcanized hard fiber cases made of fiber not less than**

**Interior of a railroad car after a fire caused by the ignition of motion picture films.**

.070 of an inch in thickness, reinforced by metal at the corners, purchased prior to October 1, 1914, may be used until March 1, 1915, for the shipment of motion picture films inclosed in interior spark-proof metal cases.

Even when packed as prescribed, a highly inflammable article of the kind should not be carried into a passenger car unless unavoidable. The careless placing of packages in contact with steam pipes or radiators may cause the spontaneous ignition of films that have deteriorated chemically. The baggage regulations of many of the railways prohibit the carriage of films in either hand or checked baggage. Sections 235 and 236 of the Act of March 4, 1909, entitled "An act to promote the safe transportation in interstate commerce of explosives and other dangerous articles and to provide penalties for its violation" read:

Sec. 235. Every package containing explosives or other dangerous articles when presented to a common carrier for shipment shall have plainly marked on the outside thereof the contents thereof; and it shall be unlawful for any person to deliver, or cause to be delivered, to any common carrier engaged in interstate or foreign commerce by land or water, for interstate or foreign transportation, or to carry upon any vessel or vehicle engaged in interstate or foreign transportation, any explosive, or other dangerous article, under any false or deceptive marking, description, invoice, shipping order, or other declaration, or without informing the agent of such carrier of the true character thereof, at or before the time such delivery or carriage is made. Whoever shall knowingly violate, or cause to be violated, any provision of this section, or of the three sections last preceding, or any regulation made by the Interstate Commerce Commission in pursuance thereof, shall be fined not more than two thousand dollars, or imprisoned not more than eighteen months, or both.

Sec. 236. When the death or bodily injury of any person is caused by the explosion of any article named in the four sections last preceding, while the same is being placed upon any vessel or vehicle to be transported in violation thereof, or while the same is being so transported, or while the same is being removed from such vessel or vehicle, the person knowingly placing, or

**aiding or permitting the placing, of such articles upon any such vessel or vehicle, to be so transported, shall be imprisoned not more than ten years.**

Motion picture films are classed as "other dangerous articles." Each package must be marked to show plainly the contents, each express or baggage package must also bear the standard yellow label, carrying the shipper's certificate:

**This is to certify that the above articles are properly described by name and are packed and marked and are in proper condition for transportation according to the regulations prescribed by the Interstate Commerce Commission.**

The packages must be transported by freight or by express on the railway lines that prohibit transportation as baggage. Where transportation as baggage is permitted, the packages must be offered for checking, or carried as hand baggage, as specified in the rules of the individual carrier, without any attempt at concealment and without avoiding in any way the requirements of the regulations. Intelligent care must be exercised during transit to protect the packages from lights, fires, contact with steam pipes and other sources of heat.

## DESTRUCTION OF PATENT LEATHER FACTORY.

The patent leather factory of the H. W. Clark Leather Company, North Woburn, Mass., was destroyed by fire on February 15 last. The building was of frame construction, two stories in height, with cement floors and roof of wood with asbestos covering. It was on an area of 150 x 300 feet about 75 feet away from the main factory building. Before the four rounds of the fire alarm were completed the entire interior of the building was a mass of flames. The woodwork was saturated with oil, naphtha and dauber drippings, a local newspaper said.

Soon after the employes went to their mid-day meal smoke was seen coming from the tacking room in the southern end of the building. The supposition was that careless cigarette smoking caused the fire to start. An alarm by telephone was sent to the fire department

**Ruins of Patent Leather Factory of the H. W. Clark Leather Company, North Woburn, Mass.**

Photo by International News Service.

**FACTORY FIRE IN NEWARK, N. J.**

**Firemen were hampered by dense smoke and gases from burning spices.**

of Woburn. The engines ran quickly to the company's premises, but the firemen were delayed by a lack of water pressure. The construction of the building favored the spread of the fire that burned six hours. Two private hydrants, with hose, were on the premises, but they were of slight service. The firemen succeeded in saving the main building.

The company was turning out about 600 sides of finished product each day of work. The loss on building and contents was estimated at $43,000. It cannot be said that the leather company was a close student of fire prevention.

## DESTRUCTION OF NEWARK FACTORY.

The factory of the J. B. Gruman Company, Newark, N. J., was destroyed by fire on January 29 last. In the four-story brick structure the company ground and packed spices and drugs. Soon after the employes, about 200 men, went to work, fire started in the second story, caused by a spark from a piece of metal or other substance in a shellac grinding machine. The flames spread to shellac and other grinding machines. An employe was stunned by the flash and was carried out by firemen. Another employe jumped from a third-story window, and was killed. The firemen were hampered by the dense smoke and the gases from burning spices. As manufacturers, and as employers, business men should study safety.

## FIRE ENGINEERS.

President Delfs, of the International Association of Fire Engineers, has called the directors to meet in Cincinnati on March 23 to set the date of, and select subjects for discussion at, the annual session. Suggestions as to date, topics to be read and the arrangement and conduct of the meeting were invited.

## GAS-ELECTRIC PERIL IN HOMES

"Safety First" is as important in the home as elsewhere. Leakage of gas from whatever cause means danger from fire, explosion or asphyxiation.

The picture shows a steel gaspipe taken from the cellar of the residence of

Thomas Barnhart, Franklin, Ohio. At 5 o'clock in the morning of December 24 the gas from this pipe ignited. There was a rubber-covered electric light wire resting against the pipe. Evidently it became grounded, melting the pipe through as shown in the photograph and igniting the gas. Fortunately the fire was discovered and extinguished with little loss of property and no loss of life.

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## ELECTRIC FIRE HAZARDS.

*March Bulletin by Clem P. Host, Fire Marshal of Wisconsin.*

Wisconsin records show a fire loss of $349,000 for the last fiscal year, due to defective electrical work. Electricity is the best and safest light when properly installed, and there is no excuse for this great loss. It is due to ignorance or carelessness of the workman and often to wilful "skinning" of the job. Proper regulation and supervision would remedy this.

The State insists that a barber must be examined and qualified to ply his trade. although we could easily avoid a poor barber or an unclean shop. The State provides no qualification for the electrician and thus unfortunately permits anyone to introduce all sorts of electrical fire hazards into buildings to cause much property loss and often loss of life. The average layman is at the mercy of so-called electricians, as he does not understand electrical work and cannot guard against its great dangers.

In this bulletin we aim to give a few instructions for the guidance of all.

*Materials.* Be sure that approved fixtures, appliances and approved rubber covered wire are used, and that the insulation on your wiring is perfect at all times.

*Entrance.* Petticoat insulators of glass and drip loops should be provided on the outside at the point of entrance, and the wires should enter through porcelain tubes, slanting upward or through conduit. We recommend the latter.

*Service Cutout and Switch.* Inside, at an accessible point near where the wires enter, an approved service cutout and switch, in metal cabinet, should be installed.

*Fuses.* The service cutouts and all branch circuits should be properly fused. The fuse is the "safety valve" of the entire system. Fuses should never be installed or replaced except by competent men.

*Wire Fastenings.* In concealed work such as attics and partitions the wires should be stretched tight and fastened to porcelain knobs every 4½ feet and there should be a distance of 4 to 10 inches between the wires. In open work, as on ceilings and walls, porcelain cleats may be used every 4½ feet. Where wires are fished down through partitions, in old buildings, a continuous piece of loom should be used from the last porcelain fastening down and through the wall to the switch or sidelight.

*Bushings.* Where wires pass through walls, partitions, floors or timbers, they should run through separate porcelain tubes, extending clear through, unless in conduit. When wires cross pipes, moldings or other wires or objects, porcelain tubes or loom should be used to keep wires from contact.

*Conduit.* Where wires are exposed to injury and in damp places, such as basements, it is best to use conduit.

*Joints.* All joints should be soldered and properly taped.

*Some Don'ts.* Do not tamper with electric wires and apparatus unless you are an electrician, nor allow your employes to interfere with them.

Do not carry lamp cords around your premises, unless they are the reinforced kind and the globe is protected with a wire basket guard.

Do not hang lamp cords on nails, hooks, gas fixtures, shafting, machines or other conductors, or fasten cords or wires with staples, nails or wood cleats.

Do not attach paper, cloth or other inflammable materials to wires, cords, lamps or sockets.

Do not put stock, boxes, barrels or other objects on or against wires or lamps.

Do not change the wiring or attach electrical devices yourself. Get a competent and reliable electrician.

Do not leave the current on when the electric iron or device is not in use, and place the iron on a metal stand.

Do not accept materials, fittings or fixtures unless approved, or work unless done in accordance with the requirements of the National Electrical Code.

Do not pay for materials or work until inspected by the city electrician, if there is one.

The Wisconsin building code requires that all electrical work and installation comply with the rules and requirements of the National Electrical Code, and it is well to insert this provision in contracts.

## ALERT FIRE CHIEF WANTS INFORMATION.

The chief of the fire department in a Pennsylvania city has had trouble, and he has written to SAFETY ENGINEERING for information, saying:

"We have had another very bad fire in our town, in fact, the worst we ever had, in which 18 buildings were burned to the ground, owing to the fact that our gasoline engine broke down just when we thought we were getting control of the fire.

"Now we are hunting for information for the best fire protection we can get. What we want now is to get in communication with people who build standpipes and good fire apparatus in the way of gasoline engines and steamer engines. Any information you can furnish us will be thankfully received.

"I have read your magazine for 6 years with a good deal of relish and I get lots of information that I could not get any other way."

## STORAGE OF RUBBISH.

The Fire Prevention Committee of the Rome (N. Y.) Chamber of Commerce recommends to the attention of all merchants the use of metal receptacles in the rear of their places of business for the storage of rubbish and papers. The committee believes that a fire hazard, which now exists where papers are scattered about or packed into wooden boxes or barrels, can be removed readily and at slight cost by the merchants. Metal receptacles while having a greater initial cost will outlast wooden ones and are in every way safer. Where metal containers are used and the cover is kept in place there is no danger of fire. Spontaneous combustion can not be spread beyond the metal cans and there is no danger of a person dropping a lighted cigarette or cigar or match into the papers thus enclosed.

## FACTORY FIRES IN NEW JERSEY.

Commissioner Bryant of the Department of Labor of New Jersey said in his report for 1914 that 375 fires had occurred in factories, an average of more than one a day. Not a life was lost. The commissioner said that the record demonstrated that protection by fireproof windows and doors at fire escapes made the means of exit serviceable at all times. He is preparing a standard fireproofing code for interior stair partitions, fire walls and elevators for all factory buildings.

## ARGUMENT FOR "SAFE AND SANE" ELECTIONS.

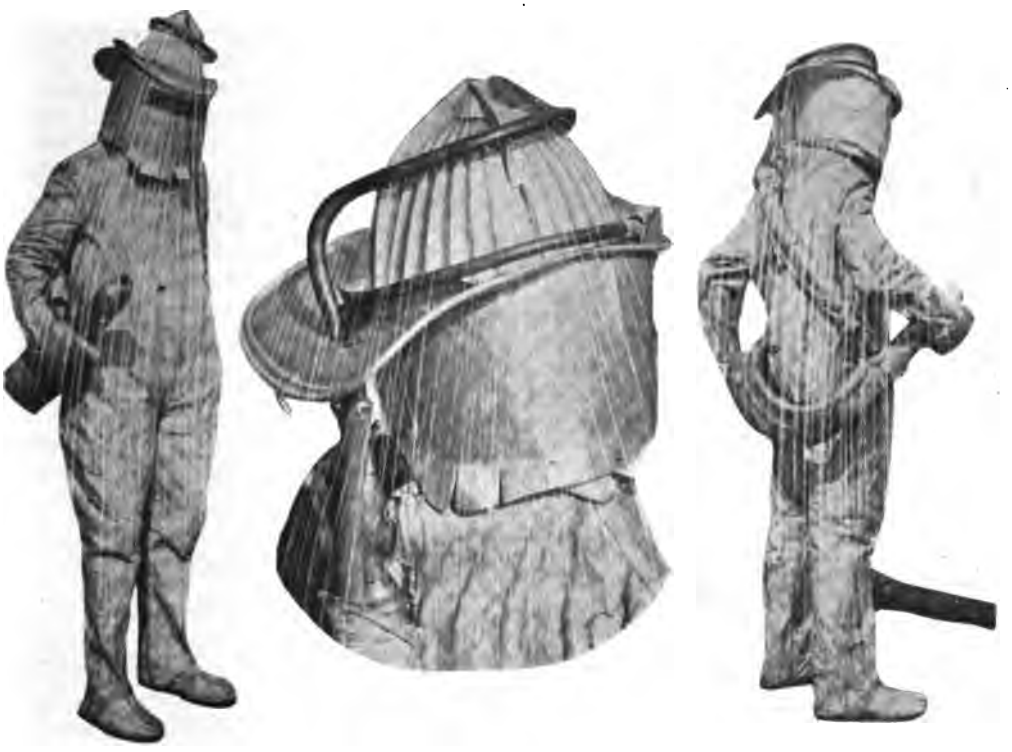
During Election Day last year a large paper balloon containing a blazing wad of alcohol-soaked cotton fell on the shingle roof of a Newton (L. I.) farmhouse and set the building on fire.

## A FIREMAN'S UNIFORM FIREPROOFED WITH WATER.

Protected by the water-fireproofed uniform illustrated in the pictures a fireman can stand right in a fire and not feel the heat. The suit is made of two thicknesses of fireproofed canvas. Between them, sewed at the neck, is a perforated ring through which tiny streams of water are showered down between the layers of canvas. The water finds outlets at the finger tips and at the soles of the feet. Through the perforated ring encircling the helmet water drenches it, also the suit, like a shower bath. With such an arrangement a fireman can walk right into a hot fire.

The uniform does not weigh more than 25 pounds and does not add much to the usual service clothing of firemen. The water supply is obtained from the line of hose in service through a one-half-inch hose connection. The water passing through this hose also operates a water motor of light weight which pumps fresh air into the helmet through another line of half-inch hose.

The uniform was tested out in Cincinnati recently. While the fireman enveloped in it stood in the center of a fierce fire of wood, coal-oil and shavings, spectators could not get closer than 20 feet to the flames, so intense was the heat. The man remained in the flames five minutes playing the hose.



**Thus Protected a Fireman "Can Walk Right Into a Hot Fire."**

## UNUSUAL CAUSES OF FIRES.

A fire in the borough of The Bronx, New York City, was reported as having been caused by "Thieves using match while breaking open gas meter (quarter-in-the-slot pattern)."

During the Dayton, Ohio, floods several disastrous fires were caused by the rising waters slaking lime in sheds containing builders' materials.

## SAFE WATER SUPPLY ESSENTIAL.

Next to air in importance in sustaining human life comes water. The only difference is that one can live a little while longer without water than he can without air. It is necessary that both water and air be pure. In order to get an adequate supply of pure water, people have brought it a distance of hundreds of

Courtesy of Inland Steel Company.

miles from its source or gone to a great expense to purify the water of a nearby supply.

Without a generous supply of pure water for drinking purposes, an industrial plant would be a failure. Sickness would be prevalent and the discomfort caused would be so great that keeping men at work would be almost impossible. This was appreciated by the management of the Inland Steel Company, which caused a well to be drilled until a bountiful supply of pure potable water was obtained. The water was then piped to sanitary drinking fountains, as shown in the illustration. The depth of the well is 410 feet.

## MINNEAPOLIS BACKWARD.

The Minneapolis *Tribune* is not proud of the fact that only 30 Minneapolis concerns display "Safety First" signals. Eighty-four do not, according to 133 replies received by the Committee on Public Safety of the Civic & Commerce Association which has been gathering information along this line.

Lack of preparation and education along lines of safety are responsible for 70 per cent of accidents, according to the same source, as given out in the February bulletin of the association.

The 133 factories which reported to the committee listed 265 accidents within a year, an average of two for each concern.

Facts with regard to traffic were found to be almost identical. In 1914 there were 130 collisions between automobiles and street cars, most of them in the residential districts. In the same period 20 persons were killed in automobile accidents.

## WORLD'S CONGRESS.

The tentative programme of the World's Insurance Congress at the Panama-Pacific International Exposition in San Francisco on October 4-16 has been prepared and submitted to the advisory board on programme. It is to be shaped definitely in accordance with suggestions as to chairmen of the various sessions and topics to be considered.

At the afternoon session on October 5 the two topics of interest to fire and safety engineers are to be "Economics of Fire Prevention and Fire Protection Work as Conducted by Insurance Companies" and "Economics in Accident Prevention and Safety First as a Result of Work of Insurance Companies." "Safety First," or accident prevention, is to be the subject of general sessions on October 11. Fire prevention and fire protection are to be subjects at the general sessions on October 12.

# EDITORIAL

**Safety and the "Jitney."**

THE MATTER of safeguarding the public who patronize the latest thing in transportation service, the "jitney," should be one of the first considerations of the authorities whose business it is to issue permits for the performance of the service. It is no unheard of thing for a chauffeur to upset a car or to collide with another car, or other object. In the event of such an accident, to whom will those bearing the brunt of the injuries look for damages? The question most pertinent at this time is: How responsible are the operators of the "jitney" motor cars?

It is said that all one must do to start a "jitney" is to have a motor car, know how to run it, get a license to carry passengers and have a route assigned him. Compliance with the requirements permits him to go forth and serve the public. This is all right while it remains "all right," but when an accident happens, what then? Can the operators meet their responsibilities for injuries and the possible loss of life?

That this ease of getting into the business is being taken advantage of is shown by the reports from cities in the West. In San Francisco, Los Angeles, Seattle, Portland, Ore., and Kansas City there were altogether more than 2,300 "jitneys," and it was estimated that their earnings amounted to the tidy sum of $19,000 a day.

While SAFETY ENGINEERING wants the public to get the cheapest and best transportation, it feels that no transportation is cheap and good unless it is also safe, and safety should be the first consideration in all of our transportation problems.

Operators of the "jitney" cars should be required to satisfy the authoritites as to their responsibility and ability to meet claims for damages for which they may be held accountable.

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**Duplication and Efficiency.**

THE TERMS are synonymous and nowhere is this illustrated more strikingly than in the chaotic condition, lack of responsibility and consequent meagre results obtained by the multiform bureaus and departments of inspection that deal with safety to life and property in States and municipalities.

In the City of New York this has become a positive nuisance and harassing to a degree where the building owners have been driven to exasperation. With no system of co-ordination as between the bureaus and departments, with their legal or assumed authority to inspect and direct, with conflicting orders from several on the same subject, the builder and owner no longer knows where he is at. Few of these building owners object to reasonable regulation as respects safety; in fact they welcome this in their own interest, provided such regulation is in conformity with the facts involved and from one organized central authority.

The error of the whole system lies in the fact that safety is and always has been treated by our States and municipalities as a politico-legal problem rather than an engineering and educational question, and exactly to the degree that that is changed will enhanced

results in safety be obtained. A commission on safety, dealing with all its phases, both as respects fire and accident, composed mainly of engineers and architects, with one responsible head and a competent corps of inspectors selected on a civil service basis, will go far to eliminate present unsatisfactory conditions. The time has come when safety as respects the general public should be treated on the same basis as it is handled successfully now by large private corporations.

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**Universal Suffrage and Universal Safety.**

WOMAN suffrage is slowly but surely sweeping eastward, and, unless all signs are misleading, the day of universal suffrage is approaching with irresistible force. Even the sincerest opponents recognize this fact clearly now.

In connection with this, these questions arise: Why are women not more prominent now in the several problems relating to our social ills? Why, for instance, do we hardly hear of them in the safety movement? Is anyone more affected by our high accident ratio than the women? Is it not a fact that as in war it is woman who suffers when father, husband, brother, or son, is killed or incapacitated by an accident? Is it not a fact also that woman's sphere and influence place her in a peculiarly advantageous position in relation to the inoculating of safety habits in the coming generation, a question fundamental to substantial accident reduction and to our continued leadership in industry and commerce?

SAFETY ENGINEERING hopes that universal suffrage will mean a long step in the direction of universal safety, and ventures to suggest that the leaders of the movement in this country be up and doing; that they lay their plans now to make the terms "universal suffrage" and "universal safety" synonymous.

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**The Truth Unconsciously Admitted.**

"BARBAROUS Russia" has banished vodka by ukase of the Czar. "Frigid Iceland" has eliminated braendevin by parliamentary action. These are certainly troublesome times for Demon Rum, and, to cap the climax, now comes a prominant American "booze" manufacturer with the following statement spread broadcast as an advertisement for his goods: "The best is none too good." Verily he hath spoken the truth.

Liquor may never be abolished in the United States by legislative decree. Public opinion, however, and a recognition of its demoralizing and deteriorating effect, its efficiency destroying qualities, is certain to bring it about. In addition to all other charges against liquor, it is undoubtedly one of the great factors contributing to our high accident ratio: therefore, in the interest of employer and employe alike, it must be eliminated. We prescribe dry territories around our educational institutions. Let us do the same as respects our manufacturing institutions, and it will eliminate itself.

Managers of large corporations have long recognized that "the best is none too good." Their refusal to promote men who use liquor at all on or off duty would indicate that they consider alcohol a menace to competency and efficiency.

# Safety Through Good Ventilating Systems

*By Edward T. Walsh, M. E*

VENTILATION is the name given to the process of changing the condition of the air in a room or other confined space so as to maintain as near as possible a given standard of purity despite the contaminating influences tending to cause vitiation. Outside of possibly the chemists' test tubes it may be said that there is no absolutely pure air. Tests made with air from the high altitudes of mountains and from the middle of the ocean show certain quantities of dust and impurities.

The problem of providing pure air in factories, workshops and other buildings has occupied the attention of investigators several years, and many standards of purity have been proposed for adoption, and recommendations as to how the standards may be achieved have been made. All authorities have agreed that health depends on an abundant and constant supply of fresh air free from contaminating substances which may cause discomfort or contain poisonous or otherwise harmful materials. The air in an enclosed room or building wherein human beings are housed cannot be kept as pure as the outside air, and all that can reasonably be required is that it be kept as pure as is practicable. The degree of purity that can be considered practical for the various industries—should be determined by competent engineers and chemists and the standards incorporated in the laws made to govern working conditions.

The present practice of requiring the ventilation of a factory or workshop to be satisfactory to any individual, like an inspector, who may, or may not, know anything about ventilation, leaves the decision as to what is satisfactory ventilation a very open question.

Pure air, free from aqueous vapor, is composed of the following constituents by volume:

| | | |
|---|---|---|
| Oxygen ..... | 20.94 | per cent |
| Carbon dioxide. | 0.03 | " |
| Nitrogen ..... | 78.09 | " |
| Argon ..... | 0.94 | " |

Helium, krypton, neon, hydrogen, traces.

There is no doubt of the unpleasant effects produced on the majority of persons by the vitiated air in a badly ventilated room and of the loss of health and predisposition to certain diseases, particularly consumption, due to living in such air. There is also reason to believe that fresh air is conducive to curing, and preventing the return of, consumption.

Infectious diseases are communicated more easily because of the debility due to vitiated air; consequently with pure air the chance of contagion is lessened. The most probable source of infection is from the organisms in the mouth and air passages. In ordinary breathing none of these is given off in the breath; in speaking and particularly coughing and sneezing large numbers are thrown off into the air of a room. The danger from the organisms of dried sputum being carried into the air, as dust, is recognized so universally, and the efforts that are made to combat this danger are so well known, that it seems unnecessary to dwell upon them here.

Loss of appetite, discomfort, headache, etc., are caused by poor ventilation, and the effects cannot be attributed to infectious organisms present in the air, because they act too slowly. It is evident therefore that factors, other than the presence of the organisms, perform an important part in the ill effects of poor ventilation. The oppressive odor, so noticeable when the carbon dioxide exceeds 7 to 8 parts, by volume, more than the outside air, is one cause of the effects noted.

The "crowd smell," so objectionable and evident in any crowded, unventilated

space, such as a public conveyance, on a warm rainy day, also causes the effects. The odor comes partly from the breath and largely from the persons and clothing of those present, and it is caused by a volatile substance in such a minute quantity that, while it is noticeable to our senses, it cannot be detected by chemical analysis. This can be eliminated largely by individual personal cleanliness.

While the unpleasant bodily effects may be produced in a comparatively cool atmosphere, heat aggravates the conditions. However, heated air, if moving, does not produce the feelings of bodily discomfort that heated air does when still. That is proved by the fact that when fans are used to keep the air in motion men and women can work and be reasonably comfortable; otherwise it would be almost impossible to work. It seems to prove also that the movement of the air removes from the surface of the body the excretions that otherwise cause discomfort.

Air becomes vitiated from any one or all of the following causes:

Human beings present, giving off carbon dioxide and consuming oxygen.

Products of combustion, and heat from lights burning openly, such as gas, torches, kerosene lamps, furnaces or open fires.

Dust from floors, walls or from outdoors, coming through open windows.

Dust and fumes from manufacturing processes and fumes from escaping gas, drains, etc.

Conditions may be made extremely uncomfortable and positively dangerous because of too much, or too little, moisture in the air, and by an excess of escaping steam.

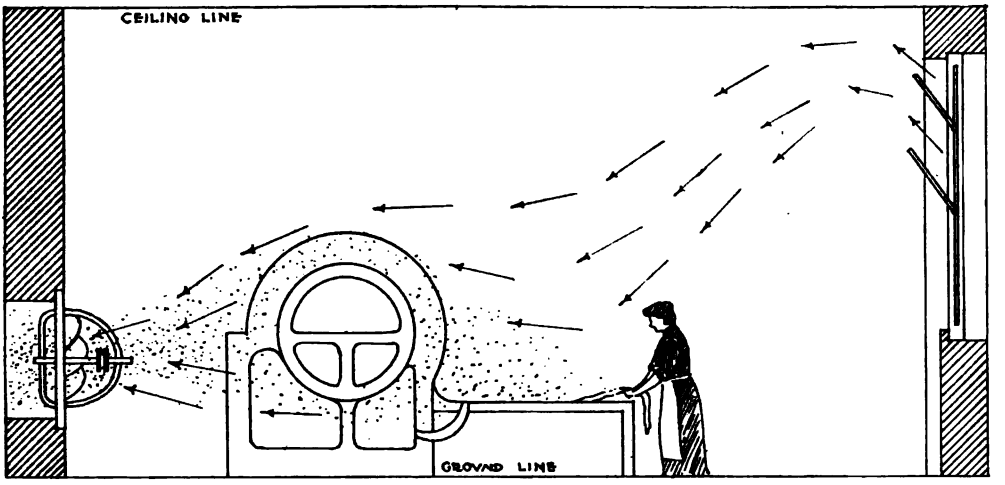
The average quantity of carbon dioxide given off by the adult human male, depending on the consumption of food, is about 22 cubic feet an hour. This quantity varies with the activity of the person, being only about .6 cu. ft. an hour if he is at complete rest, and up to 1.1 cu. ft. if he is exercising violently. A female gives off about 20 per cent less than a male. One cubic foot, for each person, has been taken as the average, although a higher average should be taken when work involves much physical exertion. Assuming the outside air to contain four parts, in volume, of carbon dioxide in 10,000 parts of air, this means that each person should have 1,250 cu. ft. of fresh air an hour, in order to keep the air of the room down to a ratio of 12 parts of carbon dioxide in 10,000. To allow for losses through leaks, etc., it is customary to provide from the 1,250 cu. ft., noted in the foregoing, to 2,500 cu. ft. an hour for each person.

It is not understood that mere increase in carbon dioxide is directly harmful to the health or comfort of the occupants of a room. Even with the ventilation very bad, the proportion of 50 parts of carbon dioxide to 10,000 parts of air is seldom exceeded, and the breathing of 30 parts in 10,000 for hours at a time does not seem to be detrimental. It requires at least 3 per cent of carbon dioxide to produce immediately perceptible effects, such as depth and frequency of breathing.

What has been said about carbon dioxide, in regard to its effect upon health, may be said about the consumption of oxygen. A diminution, or excess, of oxygen, even to 3 or 4 per cent, is not noticeable. That this is so is understood when one thinks of the "sand hogs," or men working under air pressure in caissons, on one hand, and mountain climbers and aeronauts, working in the rarefied atmosphere, on the other. The human organism adjusts itself readily to changes in the amount of oxygen in the air.

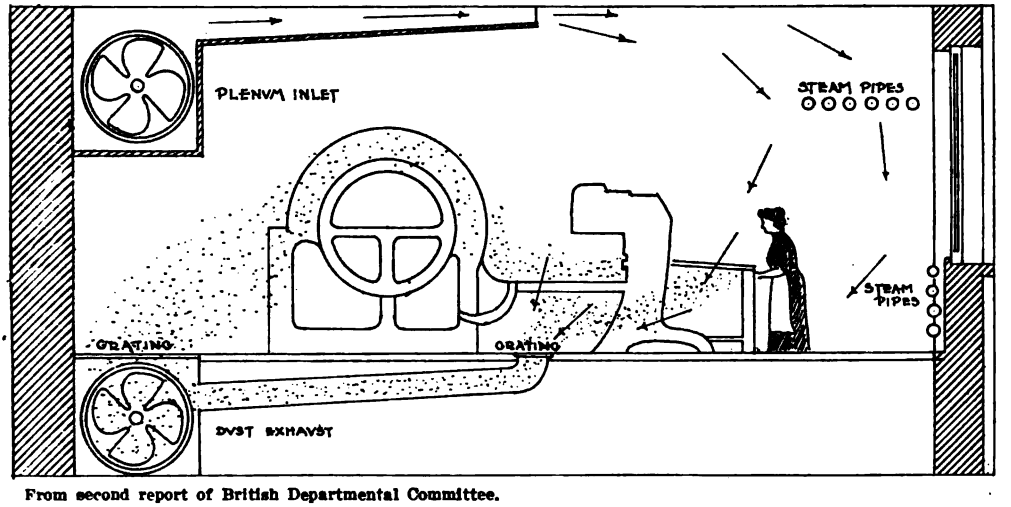
Frederic S. Lee, in his article on "Fresh Air" in *Popular Science Monthly* for April, 1914, says: "Hill says of a number of his students, whom he confined in a narrow air tight room: 'We have watched them trying to light a cigarette (to relieve the monotony of the experiment) and, puzzled by their matches going out, borrowing others, only in vain. They had not sensed the percentage of the diminution of oxygen which fell below seventeen.' The ventilation of coal mines by air containing only 17 per cent of oxygen has indeed been suggested as a preventive of explosions."

Coal miners breathe an excess of carbon dioxide and a deficiency of oxygen, yet they are healthy and, apart from inherent hazards of work, are as long lived as men in pleasanter occupations.




From second report of British Departmental Committee.

**Fig. 1. Exhaust Fan. (Placed properly. It draws dust, etc., away from operative.)**



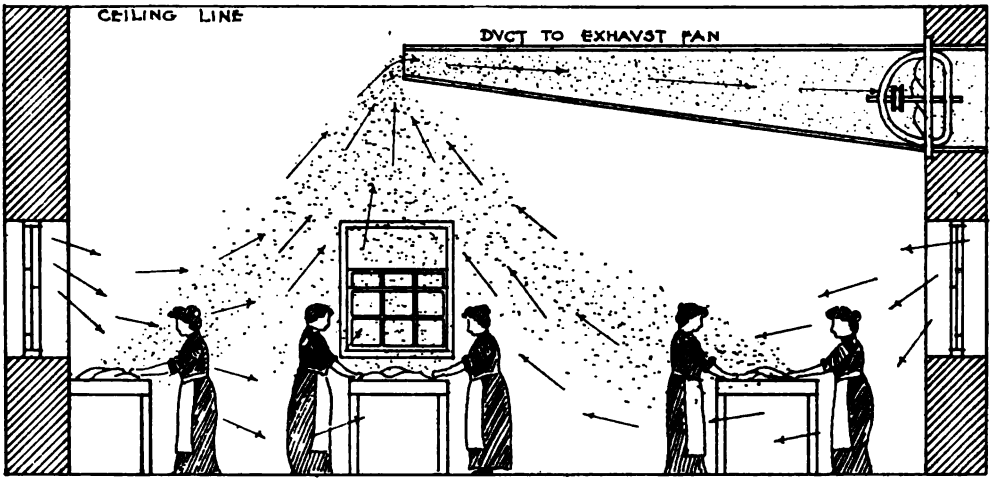

From second report of British Departmental Committee.

**Fig. 2. Plenum and Exhaust Fans. (Placed to remove dust from machine and operative.)**

Expired air, that is, as it is expelled directly from the lungs, contains as much as 1 per cent of carbon dioxide which, if not dissipated, as by means of a fan, we are rebreathing to a great extent. It has long been believed that this expired breath is poisonous, but the results of experiments to determine the truth of this belief tend to prove that it is not so.

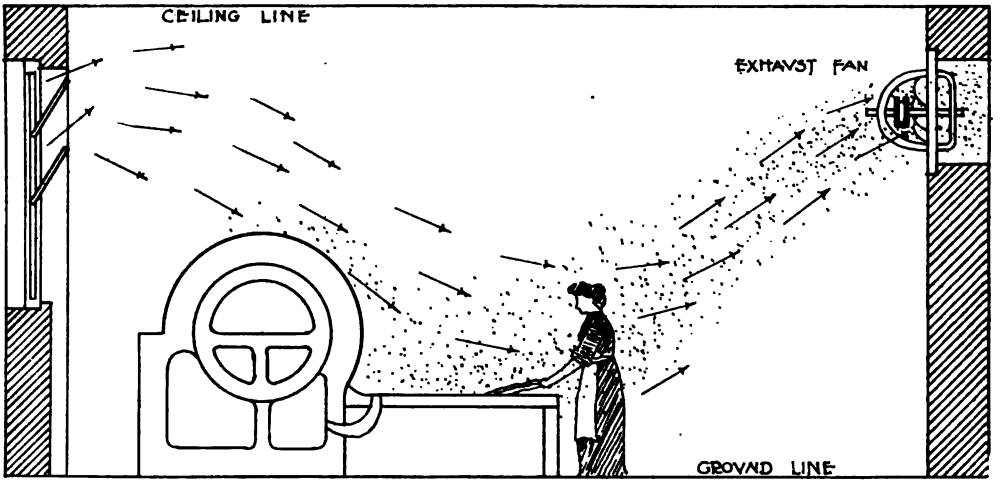
It appears that the quantity of carbon dioxide which under ordinary conditions is present in the air has very little to do with its effect on the persons breathing it. Some have said that the importance of determining the proportion of carbon dioxide in the air in a building arises solely from the fact that it is an index of conditions which are prejudicial to both health and comfort. Lee says: "We should select some other index of the air's impurity than the amount of carbon dioxide present in it." However, those who disagree with the established standards fail to provide rational substitutes.

The quantity of carbon dioxide permissible in 10,000 parts of air differs,




From second report of British Departmental Committee.

**Fig. 3. Exhaust Fan. (Placed improperly. Air duct draws dust over operatives.)**




From second report of British Departmental Committee.

**Fig. 4. Exhaust Fan Without Air Duct. (Placed improperly. Fan draws air from window and carries dust to body of operative.)**

according to different authorities. Dr. Haldane recommends 10 parts, with a legal maximum limit of 12 parts. Pettenkofer allowed 10 parts and De Chaumont proposed as low as 6 parts in 10,000. Ten parts seems to be the limit agreed upon at the present time.

It is to be understood that the purity of the outdoor air should be taken into account when tests are being made to determine the condition of air in a confined space. The quantity of carbon dioxide in outdoor air varies, depending on the locality, from 3½ to 4 parts for good country air to as high as 14 parts, which was found in a densely crowded part of London during a protracted fog. A foggy condition of the atmosphere has a great deal to do with the percentage of carbon dioxide in the air; consequently, tests of the ventilation of buildings should not be made during foggy days.

An ordinary gas jet consumes 5 to 10 cubic feet of gas an hour. It produces

about 2½ to 5 cubic feet of carbon dioxide and 5 to 10 cubic feet of aqueous vapor and consumes 5 to 10 cubic feet of oxygen. The mean of two analyses made of illuminating gas gave the following:

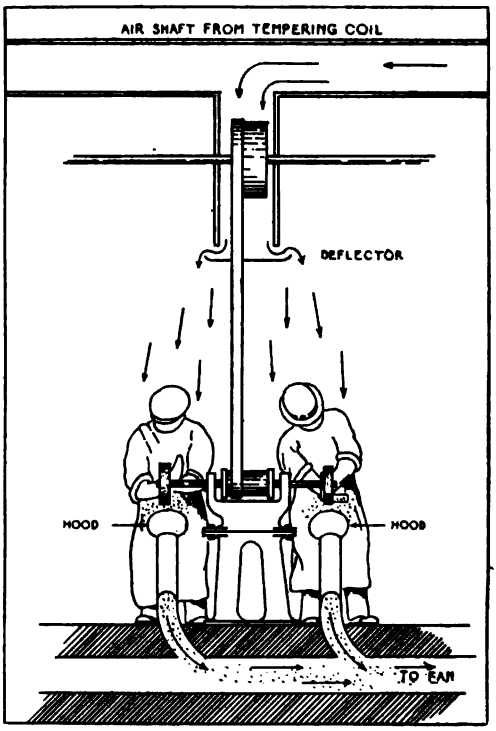
Carbon dioxide... .54 volume
Aqueous vapor... 1.19 "
Oxygen consumed. 1.14 "

These products of combustion are, in their entirety, lighter than air and, consequently, they rise to the ceiling or roof. Sometimes the mistake is made of considering them as being heavier than air and falling to the floor. Roughly, a gas jet produces as much carbon dioxide as three men and as much heat as five men.

Illuminating gas contains also a little sulphur, in the form of carbon disulphide, this is burned to sulphuric acid, causing the unmistakeable unpleasant odor of air much vitiated by gas. The quantity of sulphur in gas is regulated by law sometimes to a certain maximum number of grains per 100 cubic feet because of its effect on health. Dr. Haldane stated that air, when vitiated by gas to 20 parts in 10,000, begins to be oppressive, even with a well purified gas, while in air, vitiated to 75 parts in 10,000 by a clean paraffin lamp, no similar effects were observed.

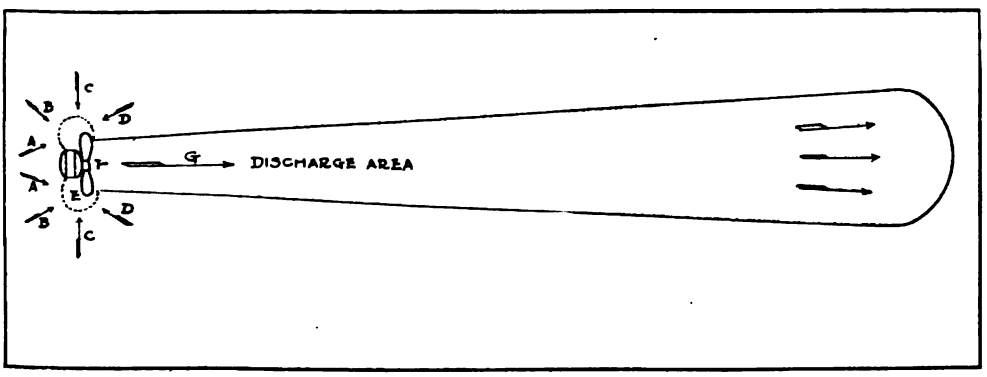
If gas jets are used for illumination, the relation of the number to the persons should be considered carefully. It is possible that the proportion of carbon dioxide may rise while the gas is lighted to 10 or 12 times what it was during daylight.

The effect of burning gas on the air should be considered in connection with ventilation. With prompt means of escape provided for the fumes, vitiation at the breathing line may not be increased much, but when air at all levels is permitted to mix before escaping, or kept in a state of mixing by moving belts, the effect of burning gas is sometimes very



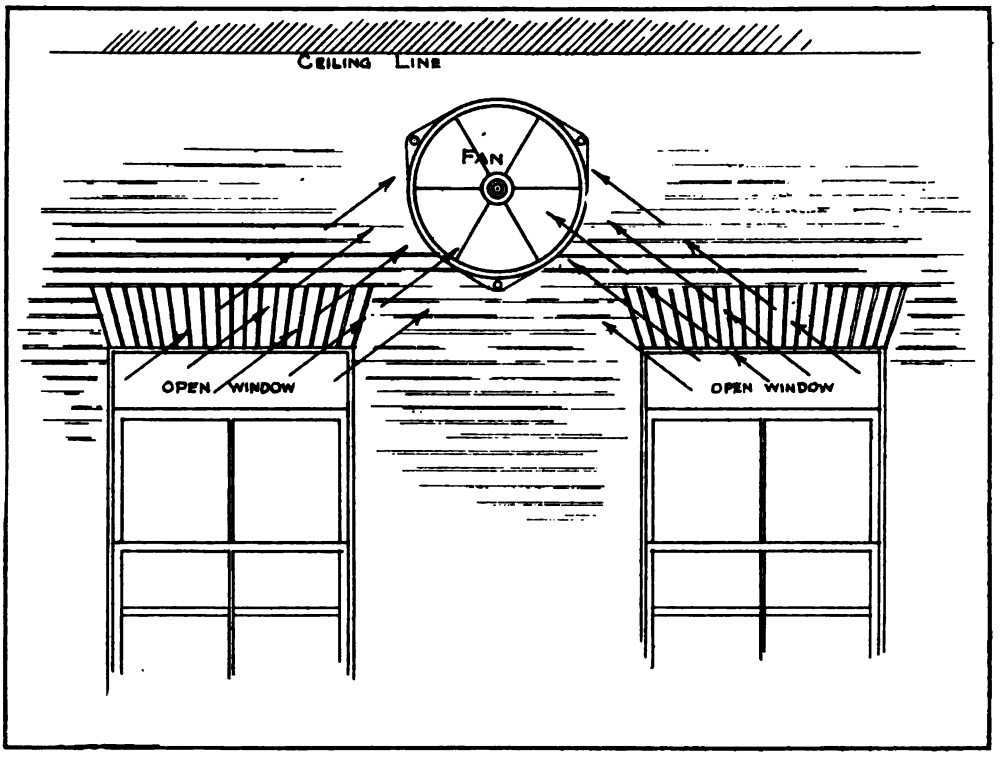

From second report of British Departmental Committee.

**Fig. 5. Combination of Plenum and Exhaust Fans.**




From second report of British Departmental Committee.

**Fig. 6. Area of Discharge from Propeller Fan.**




From second report of British Departmental Committee.

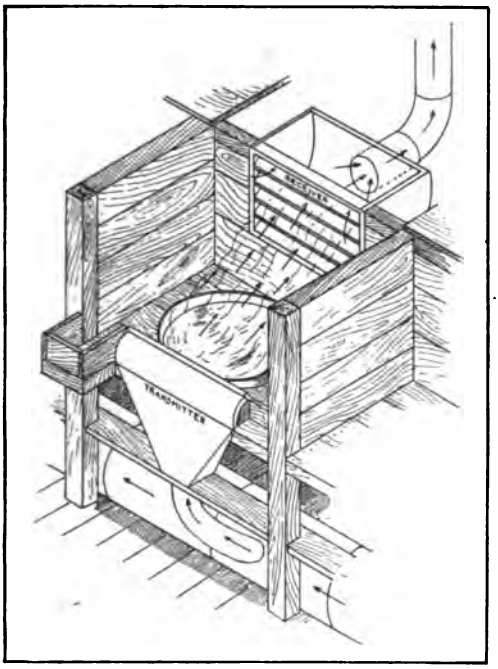
**Fig. 7. Exhaust Fan. (Placed so that air from windows is short-circuited.)**

great. A little attention to efficiency in burning gas will be productive of economy, and will diminish air vitiation. Where electric lighting is used, vitiation from the products of combustion due to the lighting is, of course, eliminated.

Heated air, containing the products of combustion, rises to the ceiling or roof in concentrated streams. It parts with its heat when it strikes the cooler surface of the roof and, unless permitted to escape, it passes slowly down again to mingle with the air at a lower level, thus building up a body of vitiated air. Provisions for the escape of the heated vitiated air should be taken into account when considering the probable effect of the products of combustion from any source on the purity of the air. High rooms are better than low ones, and when several stories are in direct communication the upper ones usually are vitiated more than the lower ones.

If gas is burned imperfectly, carbon monoxide is present in large quantities; the products of the combustion have an unpleasant odor and the carbon monoxide is dangerous to life. Gas-heated irons in tailor shops, laundries and similar places, gas stoves for cooking, gas hot-water heaters and gas furnaces should receive careful supervision.

As mentioned in an article, 157 particles of dust were found in a cubic centimeter of air taken from the summit of a Swiss mountain, and more than 200,000 were found in a similar sample of air taken from a Parisian garden. From the statement some idea may be had of the quantity of dust present in all air. In factories and workshops, whether or not the processes are of a dusty nature, more or less dust is present always. It comes from the floors and walls, and is blown in through the open windows or through cracks around doors and windows, and the volume present depends upon how thoroughly and carefully the Where electric lighting is used, vitiation clothes and persons of those employed.



From second report of British Departmental Committee.

**Fig. 8. Working Space Ventilated Locally.**

Dust may consist of lifeless organic or inorganic matter as well as bacteria and other living organisms. We inhale lots of it. Our bodies have provisions to protect us from the ordinary dust, which is usually harmless unless our protective organs are not in working order. The operations of various trades, such as cement making, cutlery, tobacco, flour and bolting mills, lead, iron, brass, steel, copper, glass, pottery and all other businesses which reduce substances by abrasion, produce harmful quantities of dust. Some of the dust produced in the trades is harmful because of its poisonous tendencies and some is harmful mechanically, because of its irritating qualities.

It is claimed that diseases, resulting from dust, such as tuberculosis, bronchitis and pneumonia, are caused by local injuries to the lungs from inhaled irritating particles, followed by the lodgement in these injuries of the bacteria that produce the specified disease. In other words, the irritating particles of dust prepare a condition that is favorable for the development of disease bacteria.

Poisonous fumes or vapors are produced in the operations of some trades, such as metal plating, stereotyping, and type-making machines, match making, lime burning, gas making, etc.

Impurities in the air occur sometimes from sources that may be called accidental sources, including leaky drains, gas from broken pipes or leaking joints, poorly designed toilet rooms or badly kept toilet fixtures. It is not an undisputed question that diseases come from sewer gas. Winslow concluded that the chance of direct bacterial infection through the air of drains and sewers is so slight as to be practically negligible. Badly kept toilets and toilet rooms may communicate diseases. It is known that the excreta of persons who are recovered from infectious diseases, or who have merely been in contact with others suffering from them, may be infectious. Such impurities should be dealt with directly at their source by means of re-vented closets and urinals.

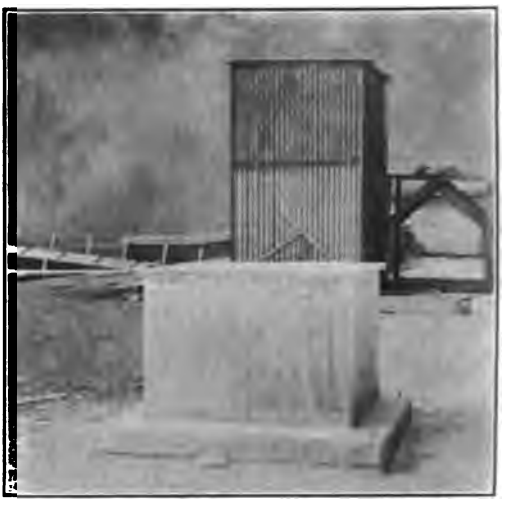
Gas for illumination, or for fuel purposes, and producer gas should be handled carefully and care taken to guard against leaks in any part of the piping, not alone from the danger of explosions, but from that of vitiating the air. Illuminating gas contains 6 to 7 per cent of carbon monoxide; producer gas, 30 per cent; pure water gas, 45 to 50 per cent. As anything more than three hundredths of one per cent of carbon monoxide produces headache in a very short time of exposure and as little as one-tenth of one per cent is dangerous to life, it is evident that leaks of gas should not be permitted to permeate the air of a factory. Water gas and producer gas have very little odor; their escape may not be noticed until damage has been done, consequently special care should be exercised where these are used.

The importance of regulating properly the quantity of moisture in the air in connection with good ventilation can not be over estimated, because humidity has the greatest influence on the health and comfort of those living in it.

The human body is burning fuel within itself constantly, thus generating heat. An ordinary man at rest develops about 9,600 B. T. U. S. in 24 hours, while a man engaged in hard physical labor may generate several times that. All of the

Courtesy of Research Corporation.

**Fig. 9. Exhaust Flue from the Treater at the Hooker Electro-Chemical Company's Plant, Niagara Falls, N. Y. (Voltage off.)**



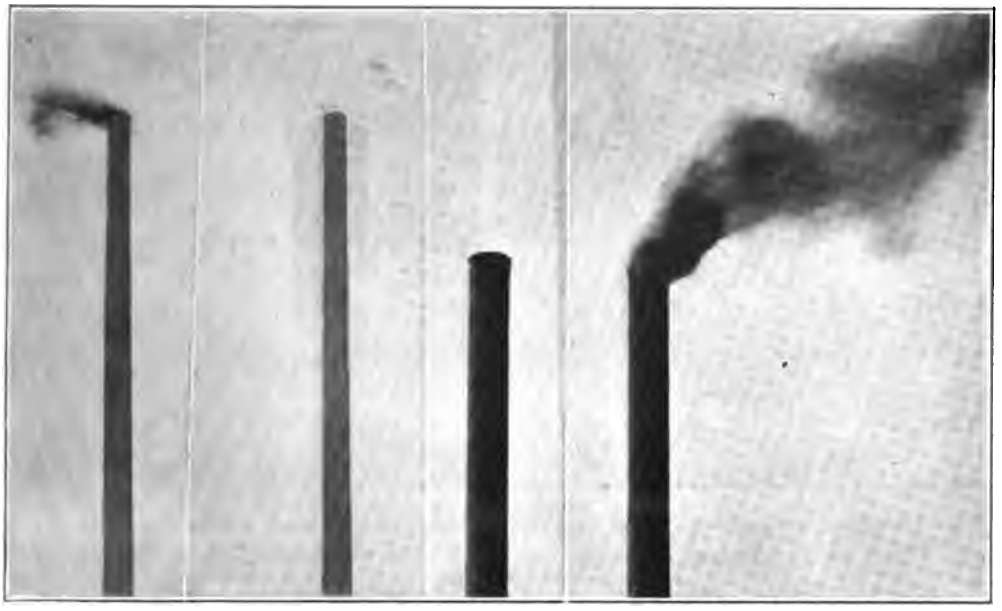
Courtesy of Research Corporation.

**Fig. 10. Exhaust Flue from the Treater at the Hooker Electro-Chemical Company's Plant, Niagara Falls, N. Y. (Voltage on.)**

heat is not wasted; some of it is used to keep the bodily tissues at the temperature of 98.6 degrees F., at which temperature a man does his best work. The heat in excess of the degree necessary to keep the heat of the body at the temperature noted passes off, and if it is not permitted to do so the man becomes overheated. Man is equipped with sensitive regulating organs, by which excess heat is given off constantly, and in such quantity as to keep the body at a uniform temperature.

Some of the surplus heat is given off in the exhaled breath, but most of it passes off from the body in the form of perspiration from the sweat glands, most of which is evaporated by the surrounding air and a little is absorbed by the clothing. The skin is the principle medium of throwing off surplus heat. The action of the skin is controlled by the nervous system which controls the action of the blood vessels and the sweat glands. Therefore, whenever a man works harder and thereby generates more heat the blood vessels supply more blood to the skin, the sweat glands produce more perspiration, and he also breathes more quickly. For comfort perspiration must be evaporated nearly as soon as it is generated, and the surrounding air should be in condition to facilitate the evaporation. If the air is cool and moderately dry, or if it is hot and dry, or cool and moist within certain limits, the body will adjust itself, but, if the surrounding air is hot and moist to the degree that it will not take up any more moisture, the sweat remains upon the skin, and the bodily heat cannot be given out; consequently the bodily temperature rises and man becomes feverish, with ultimately the result known as "being overcome with the heat." The condition of the air when it is laden with moisture to the point that it refuses to take up any more is known as "muggy," "sticky," "close"" or humid.

Humidity is the moisture or water vapor in the atmosphere, and the quantity of moisture that air will carry depends on temperature. The moisture in a given space is independent of the presence of the air; the only effect that air has is due to its temperature. Relative humidity means the percentage of the full saturation, or absolute humidity, that a given quantity of water bears to that quantity which air is capable of containing at a given temperature. Absolute humidity is the actual weight of water vapor at a given temperature and per-



Courtesy of Research Corporation.

**Fig. 11. Stacks of the Bureau of Mines, Pittsburgh, Pa. (Smoke issuing when voltage is off and not issuing when the voltage is on.)**

centage of saturation, and usually is expressed in grains per cubic foot.

Low temperature and high humidity are conditions that are more trying and uncomfortable than high temperature and low humidity. Rubner, a German hygienist, made observations that showed that at 75 degrees F., with a humidity of 80 per cent, an untrained man could be comfortable only by remaining at rest.

The temperature of the air is determined usually by the ordinary thermometer, known as the dry bulb thermometer. Humidity is measured by the wet bulb thermometer, the bulb covered by a piece of clean, soft, wet cloth. It gives a reading lower than that of the dry bulb thermometer in proportion to the evaporation from the wet surface of the cloth, and the depression is a measure of the moisture in the air. The depressed reading corresponds to the temperature at which the air would saturate normally, without any change in its heat contents; that is, the total heat in the air remains constant at a constant wet bulb temperature.

Air at which the wet bulb thermometer indicates 70 degrees makes ordinary clothing uncomfortable, and that temperature should not be exceeded in workshops and factories, except under exceptional conditions. Experiments show that at 88 degrees, wet bulb, the temperature of the body rises, although the person is stripped to the waist and not working and that if muscular work be attempted it rises rapidly. At a temperature of 80 degrees, wet bulb, with ordinary clothing, discomfort is greater. It is not the high temperature of the air that matters but the high humidity. With dry air, so that the wet bulb does not exceed the limits specified in the foregoing, temperatures up to 130 degrees or more can be tolerated without the bodily temperature rising very much. Much higher wet bulb degrees of temperature can not be bourn for short periods without the body temperature rising to a serious degree.

That the importance of having a supply of fresh and dry air to remove the excessive heat and excessive humidity which interferes with the proper action of the skin in regulating the bodily temperature is of greater moment than the supply of air for breathing is shown by experiments. The investigators placed subjects in small, closed rooms, con-

Courtesy of Research Corporation.

**Fig. 12. Anaconda Copper Mining Company's Tester at Leaching Plant. (Voltage off.)**

Courtesy of Research Corporation.

**Fig. 13. Anaconda Copper Mining Company's Tester at Leaching Plant. (Voltage on.)**

structed so that the occupants could at will breath the outside air through tubes which passed through the walls of the rooms or breath the vitiated air of the rooms in which they were confined. It was found that confinement in, and breathing the air of, the rooms brought on symptoms of distress; remaining within, but breathing the air from the outside through the tubes, brought no relief. If they stepped outside they were relieved immediately. Staying outside and breathing through the tubes the vitiated air of the rooms caused no unpleasant symptoms. If the subject stepped inside again the distress reappeared at once. Starting fans in the rooms, stirring the vitiated air, and driving the hottest air away from the skin brought instant relief. It would seem, from the experiments, that, instead of providing generous quantities of comparatively pure air without regard to its temperature and humidity, we should pay more attention to getting a supply cooled and dried properly.

However, there is danger of having the air too dry. This is a fault found usually in dwelling houses, offices, churches and other buildings which are heated by steam or hot air. The lack of moisture is conducive to the development of dust, excessive evaporation of moisture from the skin and the consequent cracking and destruction of the mucous membrane of the nose, throat, eyes, etc. With the open fireplaces and stoves of the past the houses were not heated so generally as to lower the humidity.

Ventilation may be had naturally without special openings or it may be that special openings are provided. If there are no special openings, the fresh air enters the room by way of chinks and crevices around doors and windows and their frames, also through cracks in walls, and the heated air leaves the room through crevices and cracks at the roof, as proved by experiments. It was found that when the crevices and chinks around the doors and windows were well stopped up the ventilation was decreased 28 per cent as compared with the condition when doors and windows were closed in the ordinary way. Chimneys offer great help, especially with fires burning.

Ventilation, as just described, is suitable only for small rooms. Larger rooms change the air more slowly, and in very large rooms the air may be very bad in spite of the fact that the volume for each occupant is very large.

Difference in temperature is a help in

making changes, but a wind is a greater help. A slight breeze, 10 miles an hour, has been found more effective than a difference of 20 degrees in temperature.

Special provisions for ventilating are necessary nearly always unless the space for each person is large or the roof very permeable. Large or crowded rooms should be furnished with fans. Good results may be obtained without mechanical equipment if there is no crowding and the manufactured products are not injured by variations in the external atmosphere. Windows, when used for ventilation, require constant attention, depending on temperature and wind; they should be opened as high up as possible so as to keep the draft off operatives and allow heated air to escape.

Natural ventilation should have the attention of someone delegated to do that work. It will be found difficult to regulate if the room is crowded, and success will depend a great deal on the heating equipment.

Ventilation by fans has been found to have many advantages, such as unlimited quantities of air supply always under control. The supply may be heated, moistened and filtered, and dust and fumes may be removed locally. Fans may be placed at either inlet or outlet of the air ducts. If the air is to be treated in any way, it is more convenient to place a fan in the inlet so that no untreated air can enter the room. If air is not to be treated, the fan, which should be used to exhaust, may be placed in the outlet, high up, the fresh air supply coming in through walls and windows. Fans should be located so as not to draw fumes across a room. Figs. 1 and 2 show fans in the proper location; Figs. 3 and 4, in improper location. Often inlet and outlet fans are used to advantage, as shown in Fig. 5.

In all systems of ventilation proper arrangements should be made to have an adequate supply of heat, because the success of one depends upon the other. The effect of ventilation on the temperature of a room during the winter months should be considered and efforts made to maintain the temperature best suited to the workers occupying the rooms. Some occupations require more heat than others and some are best located in open sheds. The more nearly conditions approach the outdoors the better.

Where fans are used for ventilation, either the plenum or the exhaust systems may be used, and care should be used to select the system best suited to the purpose. The exhaust system is simpler. Fans may be located in windows, walls or roofs and the fresh air allowed to filter in through cracks or crevices, or specially arranged openings may be provided for the incoming air. No ducts are needed and the fans do not cause draughts. Where fans are used to force the air through inlets or ducts into a room the air is driven straight forward, creating direct draughts. Fig. 6 shows the draught produced by a propeller fan.

Where special openings are provided for the exhaust system, they should direct the incoming air upward to avoid drafts and should be placed around the room for equal supplies of fresh air. Fans should be placed so the incoming air will not short circuit, as shown in Fig 7, and it is sometimes an advantage to place them at the floor level, from which dust is removed with the least loss of heat.

The plenum system has the advantage that the incoming air may be conditioned to suit. As the delivery of the air at the openings is under complete control, quantity and quality can be made to suit. The source of supply may be controlled and contaminating sources avoided.

In considering a ventilating system, it is wise and economical to engage the services of a reliable heating and ventilating engineer, who will study the requirements and supply the particular solution to the problem. One of the first points to be considered in the design of a ventilating system is the quantity of air required and its proper distribution. The quantity required will depend on distribution, as a relatively small quantity well distributed is better than a large quantity poorly distributed.

Ventilation may be either general or local, or both, as the case may require. Usually it is a combination of both. Certain impurities which cannot be removed by local ventilation must be removed by general ventilation. They include

respiration, products of combustion from open gas jets or other sources, water evaporated in wet processes, heat given off by moving machinery, and, in some cases, dust. In removing the impurities and causes of inconveniences, the supply of air must be adequate to perform the work intended. If heat and dust are to be removed, there should be enough air introduced to do that thing and not merely dilute the existing atmosphere.

The quantity of air required to keep the atmosphere within the limits of 12 parts carbon dioxide to 10,000 parts of air may be estimated readily, but the quantity required to remove the excessive heat cannot be computed so easily, because the loss of heat through walls and roof is not known usually, and it varies with the weather.

Dust, fumes and steam, and all other impurities that can be removed, should be removed by local ventilation, so as to prevent their mixing with the air of the room. Wheels for grinding, polishing, etc., should be enclosed in hoods and the portion of the wheel that is left exposed should be as small as is consistent with effective work. Operations of a dust producing nature should be carried out by mechanical arrangements boxed in so as to prevent the escape of dust and the arrangements connected to exhaust vents. Similar apparatus is important when poisonous or otherwise harmful substances are produced. Where it is not possible to enclose the operations efficient respirators should be used.

Where products, in which dust, poisonous fumes or spray are given off, are manufactured by hand, locally ventilated working spaces should be provided, as shown by Fig. 8. The table for the work should have an exhaust opening through it, or behind it, to draw the dust away fom the operative. Sometimes a hood of glass or metal is provided; it helps the exhaust.

Local ventilation is carried out best by means of a centrifugal exhaust fan, but propeller fans may be used if the ducts are large and the velocities low. Where fumes to be removed are of a corrosive nature, the fans should be protected from the action of the fumes. This may mean that they are to be of a special acid-resisting metal. Fans should be protected from dust or grit at the bearings or other parts, also from fibrous material in the moving parts.

The method of removing dust, fumes and smoke by electrical precipitation is occupying the attention of experimentalists, and some remarkable results are being achieved in the experimental and practical applications. The Research Corporation of New York City has been successful in condensing sulphur acid mists, removing cement dust from kiln stacks, recovering fumes from silver refinery gases, removing chlorine gas, smoke, tar from gas, and 95 per cent of the suspended matter from the gases of copper matte converters. The last mentioned carries a large percentage of lead compounds.

Electrical precipitation has to do with the effect produced on material particles when they are introduced into an electrical field, and "is inseparably connected with the phenomena of ionization and the laws of electrically charged bodies."

Fig. 9 shows an exhaust flue from the treater at the Hooker Electro-Chemical Company's plant at Niagara Falls, N. Y., with the voltage off. It shows the dense fumes passing off into the atmosphere. Fig 10 shows the plant a few seconds later, with the voltage on.

Fig. 11 shows the stack of the Bureau of Mines treater, Pittsburgh, with the voltage on and off.

The treater at the experimental leaching plant of the Anaconda Copper Mining Company is shown with the voltage off, in Fig. 12, and with the voltage on, in Fig. 13.

These are examples of removing fumes and dust at the source.

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First of two articles on this subject by Mr. Walsh.

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A physically fit man is certainly a safer man.—*L. R. Palmer.*

Every safety man soon realizes that he must go beyond the question of mere accident prevention, and take up points of housing and a number of sanitary features.—*Dr. Lucian W. Chaney.*

We yearly offer several thousand dollars in cash and other prizes to men who can suggest improvements of all kinds; and they are especially urged to make safety suggestions.—*Paul E. Illman.*

# ELEMENTS OF SAFEGUARDING

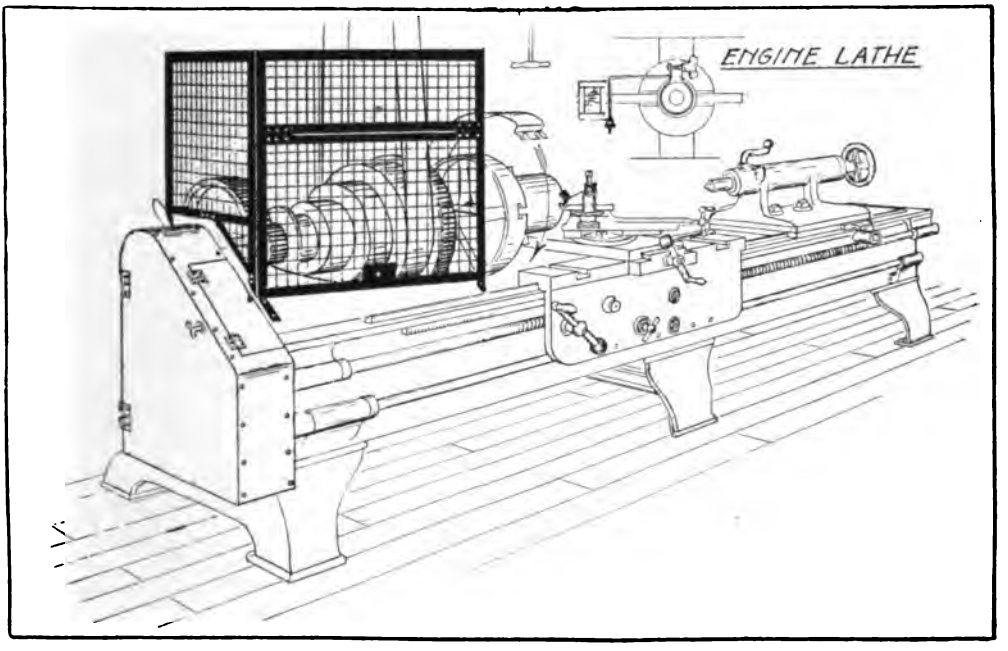
## ENGINE AND TURRET LATHES.

*By F. W. Bail.*

THE guarding of lathes in a plant typifies often the degree of the guarding of all other machine tools in the plant. It is on this very machine that the subject of guarding is threshed out often and the policy of guarding an entire plant determined. There is more tradition about this most common of all machines than any other, and many a good workman of the old school of journeymen machinists feels that guarding his lathe completely casts serious reflections on his ability as a mechanic to keep out of danger. The fact remains, however, that engine and turret lathes, because of their numbers and the many operations to which they are adapted, form two of the greatest hazards in the general machine shop.

The occasional workman's prejudice against guards can be overcome gradually by proper shop discipline, but the attitudes of owners on the subject of guarding in general affects the manner of guarding the lathes in particular and their points of view should be considered before methods of guarding are determined.

Many owners have for years endeavored to guard machine tools as completely as possible through humanitarian reasons only; others have fallen into line since the efficiency movement has proven beyond a doubt that a workman's output is increased materially and the quality enhanced if he can give his entire attention to his work without being obliged to be on guard constantly lest injury befall him. In other words, they realize that material guards are far cheaper and much more dependable than mental guards. Owners of the more skeptical class, who have maintained that it was folly to "fool-proof" machines for good mechanics, are beginning to see the light as States adopt workmen's compensation laws. It, therefore, appears that most owners are willing and glad to have the shop superin-

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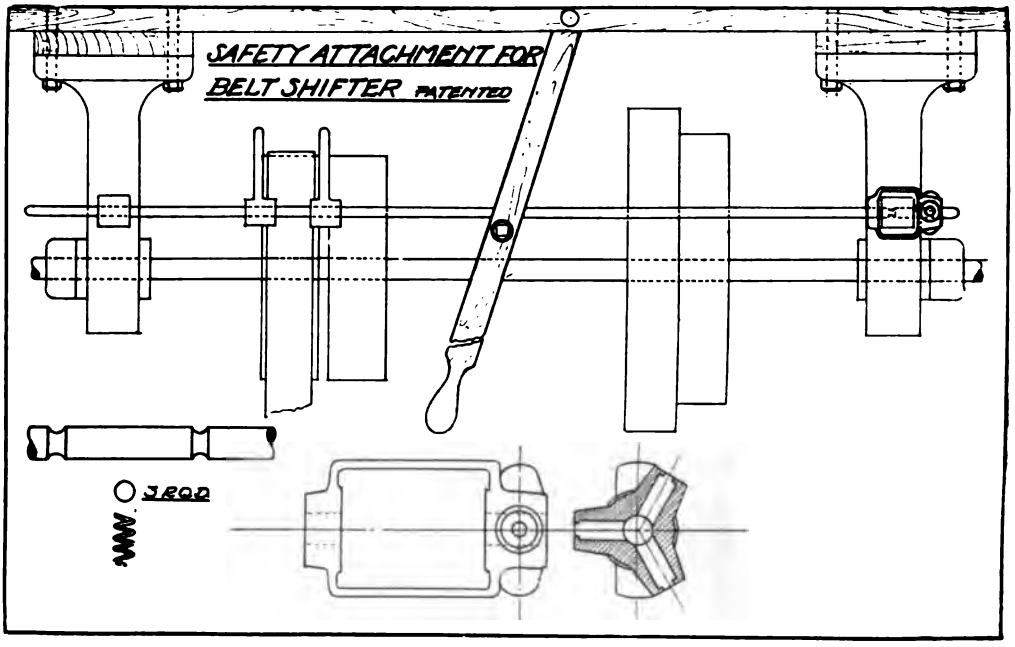


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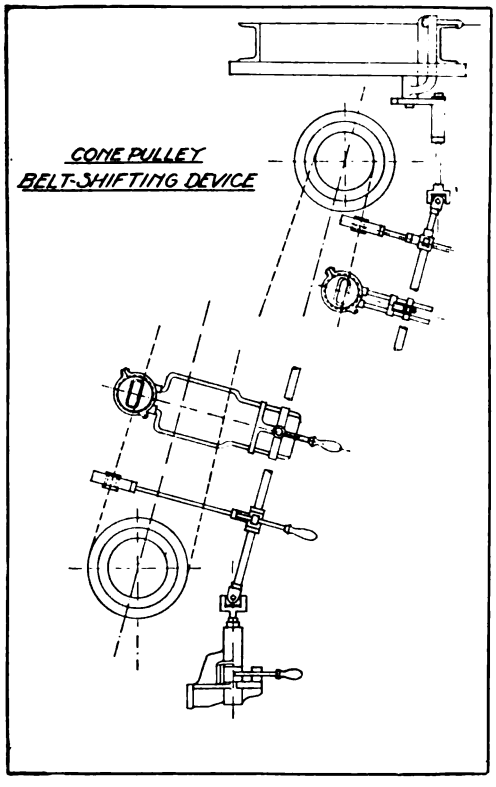


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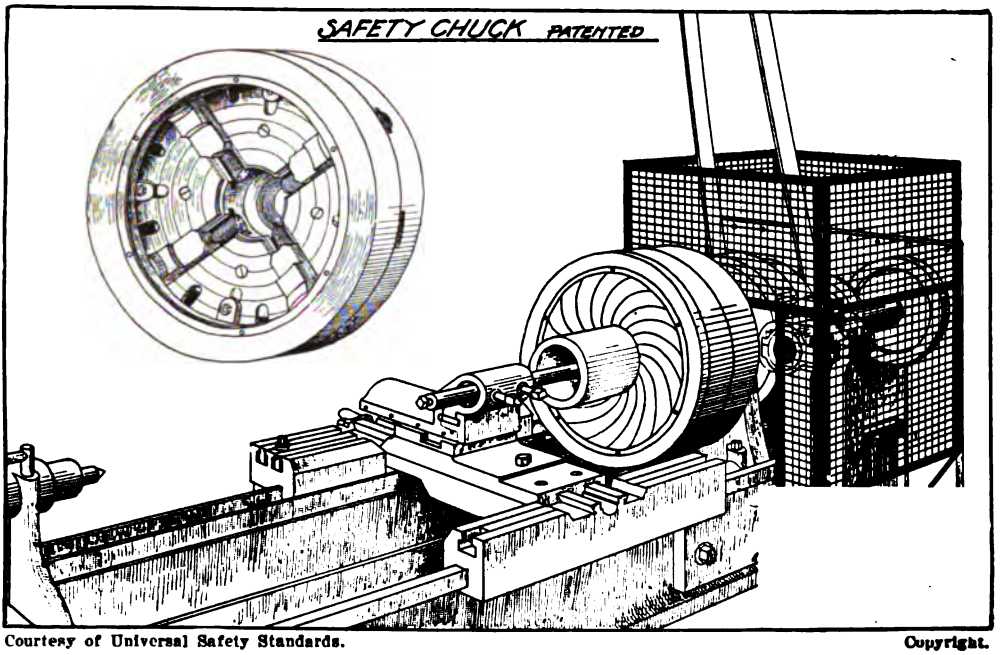
tendents and workmen guard their lathes as completely as practicable, and the few who are still unwilling to make the investment in guarding will soon be compelled to do so by the war against needless accidents which is being waged from coast to coast.

The time is not far distant when the demand for completely guarded machine tools will be so great that lathe manufacturers will compete in guarding as well as in power, rigidity, accuracy and simplicity. A comparison of the engine lathe manufactured ten years ago with that on the market today gives a good idea of the speed with which the safety movement is revolutionizing machine design. In the former, even the back gearing was seldom guarded. At best only the intakes were guarded. Today most of the gearing has the teeth enclosed by band guards and the feed gears often are enclosed entirely.

Very few lathes are, however, guarded completely as yet, and, even if all were guarded perfectly, the old equipment cannot be scraped, but should be made safe until it has completed its service.

The typical engine lathe shown should fulfill the requirements in guarding:

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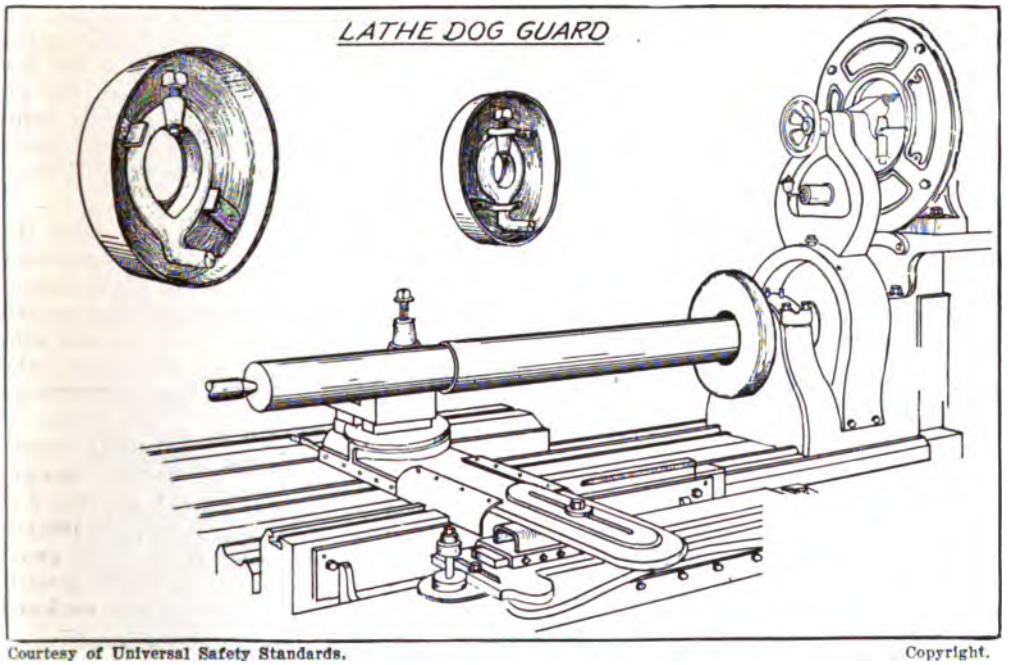


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Tight and loose pulley belt shifter or clutch lever should be equipped with automatic locking device. A good type of lock is shown in the accompanying drawing.

Driving belt should be enclosed to a height of 6 feet from floor. It may be found convenient to include the back gearing within this guard. If so, the back gear shifting lever should extend through the guard and, where a spring plunger is used to lock the back gears in

position, an opening should be made in the guard over the front of the spindle bearing to permit easy access to the plunger.

A cone pulley belt shifter should be applied, the shifting lever to extend through the guard. A home-made cone pulley belt shifting device is shown in the accompanying drawing. There are also several good devices on the market.

All power driven gears should be enclosed completely. Where space permits, a solid metal housing is the most efficient guard for the feed belt and gears because it not only guards completely but it keeps the gears clean, and if extended to the floor serves for storage of change gears.

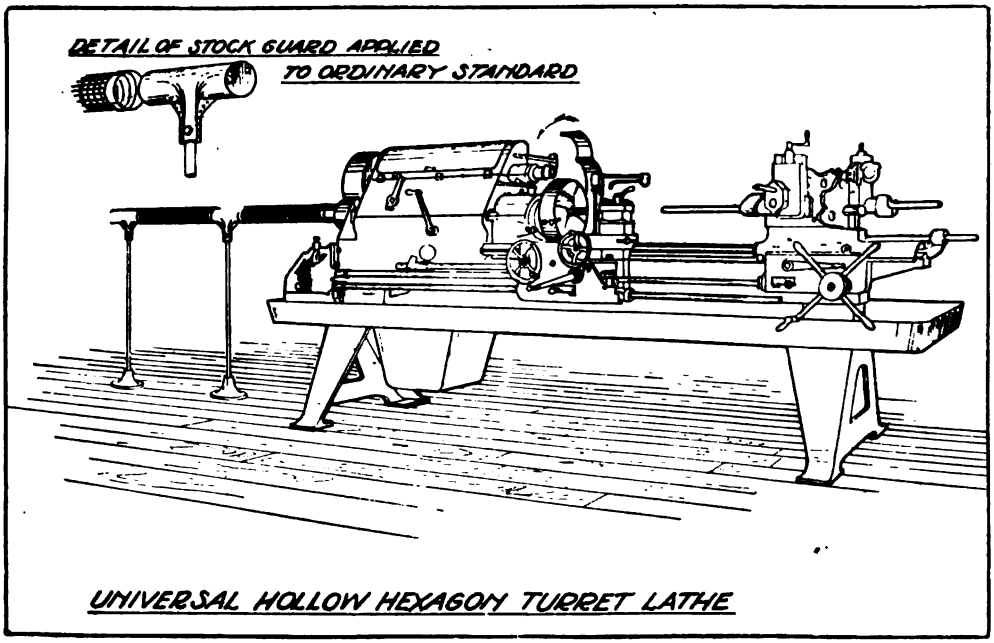
Chucks should be preferably of the safety type as shown, or the jaws should be enclosed by a stationary band guard with provision made for adjusting them. Special jigs are often very dangerous but they can be guarded easily by an inverted U-shaped piece of sheet metal clamped to the shears or the side of the bed.

Lathe dogs should be of the safety type, or enclosed, as shown.

The tool should be guarded, as shown, or the operator should wear goggles.

Where motor driven lathes are used, all openings in motor exposing rotating or live parts should be covered. The motor should be controlled by a switch and starting box of the enclosed type with control located convenient to the operator.

The turret lathe should fulfil the same requirements in guarding as the engine lathe, but an additional hazard in the revolving bar stock is presented, and it should not be neglected. The stock can be guarded easily, as shown, or a guard can be constructed by hinging a split pipe and supporting it by the standards. Most turret lathes have a quick change gear mechanism encased in the head stock, and in this regard they are precursors of the revolution that the safety movement is certain to bring about in machine design.

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The fundamental safety principle is a comprehensive discipline system.—*T. H. Carrow.*

The abolition of alcohol from the industrial and business world would mean a marked gain in health and efficiency on the part of workmen in general; and would quickly diminish the large percentage of those who, through its ravages, are confined in hospitals and asylums.—*Dr. A. M. Harvey.*

# RESCUE WORK AT LAYLAND MINE

*By George S. Rice, Chief Mining Engineer of the United States Bureau of Mines*

IN VIEW of the great interest being manifested in the rescue operations at the mine of the New River & Pocahontas Coal Company, near Layland, West Va., following the explosion on March 2, as indicated by the many inquiries that have come to the Director of the Bureau of Mines regarding the rescue of 47 entombed men, the following statement has been prepared, based on reports submitted by members of the bureau's rescue corps, and from general information obtained during a visit to the mine.

The recovery of the entombed men furnishes a splendid illustration of the wisdom of men who have escaped the direct violence of an explosion in bratticing themselves off, when the exits are filled with afterdamp; and of the importance of their keeping calm and collected under the trying conditions which prevail after an explosion.

The Layland explosion killed or imprisoned more than 160 men, and in addition one man on the outside of the mine was killed while passing the main entrance, when the force of the explosion burst out.

Steps were at once taken by the local management, and later carried on under the personal direction of H. M. Bertolet, general manager, after his arrival at Layland, for the recovery of those entombed. The main exit or haulage way was partly blocked, so that entrance was made into the air course. The fan floors had been blown away, but in less than half an hour the emergency repairs had been made, and the fan was forcing air into the outer part of the mine. Most of the ventilation stoppings had been blown down, so that brattices had to be placed in the crosscuts, in order that advance could be made, since, at that time, there was no ooxygen-rescue apparatus at hand.

By reason of the prompt repairs to the fan, the ventilation was restored along the outer part of the main air course, which made it possible for seven miners, with the assistance of the advance rescue party, to escape from an entry which had not been penetrated by the explosion.

State Inspectors L. B. Holliday and J. I. Absalon were soon at the scene, followed by Chief Inspector E. A. Henry and Inspectors R. B. Cobb, L. Blankinsopp, I. Murray and E. C. Lambart. The inspectors worked untiringly in the search for survivors and the location of bodies.

Everyone who has a knowledge of the facts agree that the work of recovery was conducted with the utmost system and care by the State inspectors and mine management, and the latter saw to it that nothing in the way of supplies should be lacking.

Thanks to the railroad officials of the Norfolk & Western and the Chesapeake & Ohio, a record-breaking run was made by the Bureau of Mines Car No. 8 to reach the Layland mine. The car was on a branch road three miles from Glenalum, West Va., when the notice of the explosion was received at 12:15 p. m. The matter was at once taken up with the officials of the Norfolk & Western. With remarkable promptness, they arranged to send the car to Kenova. It left Glenalum at 12:50 p. m. and reached Kenova, 104 miles, in three hours, which required getting several trains out of its way. At Kenova the car was turned over to the C. & C., that had prepared for a clear track, and hitched on, what is said to be, the second largest passenger engine in the world. The 133 miles were covered in three hours and sixteen minutes, which is said to be the record time on this mountain road. The car was then pushed up the steep 6-mile grade to Layland.

Rescue apparatus was flung hastily into waiting cars, which took the party to the incline and two miles beyond to the mine mouth. At 10:30 p. m. the

crew, consisting of D. J. Parker, mining engineer; Dr. W. A. Lynott, surgeon; H. D. Jones, foreman miner; R. H. Seip, the first-aid miner, and Edwin Staley, clerk, was placed under the orders of the State inspectors, and the rescuers entered the mine for exploration work. The oxygen-appartus crew of eleven men of the Gary miners had volunteered, on the announcement of the disaster by General Manager O'Toole, and started about the same time as Car 8, but having to come by regular trains, did not reach the Layland mine until the next afternoon. The Gary crew, that did valiant service, was under the charge of Chemist Kifer and it had as members Andy Toshie, John Christian, H. K. Payne, Julius Kovacs, Nick Sharkey, Richard Haynes, Mike Skipicsky, John Thirtle, Louis Toth and H. L. Rose. J. W. Paul, the bureau's chief of rescue operations, with his assistant, H. D. Mason, arrived with the Gary crew.

The eleven Gary men and the mine bureau men made up three rescue crews thoroughly trained in the use of oxygen-rescue apparatus. Under the direction of the State inspectors and Mr. Paul and the general direction of Mr. Bertolet, they worked in successive 2- to 6-hour shifts, exploring in advance of the rescue men without apparatus, who were engaged in bratticing and the recovery of the bodies. The advantage of the advance exploration was to insure there were no smouldering fires which might start up with restored ventilation and thus cause explosions through igniting any firedamp that might have collected, and also to expedite the work of rescuing men and locating bodies.

The explorations continued from Tuesday to Friday night, by which time Mines 4 and 5, which are turned off Mine 3 and not independently connected to the surface, had been explored and most of the bodies taken out.

An exploration was then made by one of the oxygen-apparatus crews in the main haulage entry of No. 3 mine, as far as the sixth left entry, which developed that the main entry had few falls and little wreckage. This led Chief Henry to plan a reversal of the air current to permit use of the haulage road, since meantime the blockage at the mouth of the mine had been largely cleared away. To reverse the fan required repairs; accordingly that night all men were withdrawn to permit stopping the fan.

While the fan repairs were being made on the following Saturday morning, Mr. Paul, who happened to be in the mouth of the main entry, was astonished to see five men come out of the mine. They said that they were from the ninth left entry, where they had bratticed themselves in, following the explosion. It appeared that the shutting down of the fan the previous night had caused the atmosphere to clear up partly in the No. 3 haulage road. The men were in good condition, having had plenty of water and a considerable quantity of food, having collected twenty buckets of water before they bratticed themselves in. They had left a small opening and kept a guard to watch when the air cleared up, and finally they came out. The air was not entirely normal in the ninth left.

Naturally the most intense excitement prevailed, and it at once awakened hope that others might be alive in the mine, although the men said to Mr. Paul that there were no others alive in the ninth left. It was thought, however, that there might be other live men in other cross entries; accordingly the oxgyen-rescue apparatus men were called and one of the crews and part of another were told to go to the tenth left, the other rescue-apparatus men being held in reserve at the entrance of the mine. Meantime inspectors and other rescue men hurried in, but decided to first search the ninth left.

The oxygen-rescue crews from Gary and the Bureau of Mines, on reaching the mouth of the tenth left, found a written notice, "March 4, forty-two live men in tenth left." The rescue men pushed on into the tenth left and found a strongly built gob stopping of rock, coal and fine dirt, which they broke. The canary, which was being carried,

showed no ill effects from the atmosphere, and, accordingly, a messenger was sent out to notify Chief Henry and Mr. Paul that there were live men in the tenth left, that the rescue crew had gotten through a barricade and that the air was all right, and to bring blankets and stretchers.

The party then proceeded and found another barricade 200 feet beyond the first, which they started to break through. Meantime, Mr. Klier of Gary, the messenger, found Inspector Holliday and four men at the ninth left, and told Mr. Holliday of the message. Mr. Holliday thought it would be advisable that Mr. Klier should go back with them, which he did. On arrival at the inner barricade one of the unhelmeted men was sent to the outside to carry the message for blankets and stretchers, and the unhelmeted men finished breaking through the stoppings, disclosing the group of entombed men, who had gathered around the inside of the barricade. Mr. Holliday and the rescue men then entered and helped the men through the hole in the barricade one by one. It was found that all the 42 men who had been inclosed were alive and in fair shape, considering that they had been confined four days, with only the food from five dinner pails and a little bad water. They were then lined up along the entry, the rescue men were placed at intervals, and the procession moved outward.

Mr. Bertolet and Chief Henry, who had entered the mine on receiving the message, had sent for blankets and stretchers, which were hurried in. Some of the rescued men were quite weak, and two of them had to be carried out on the stretchers. All of the men were wrapped up and taken to a detention station for proper medical attention.

The experience of the 42 men was set forth so strikingly in a newspaper interview in the Charleston *Gazette* with one of them, Thomas Whalen, when he passed through Charleston a few days later, that the substance of it is worthy of repetition, although the accuracy of the detail cannot be vouched for by the writer. The parenthetical statements of known facts have been inserted to make the meaning clear. The interview is:

"Thomas Whalen, oldest survivor, with son John, worked in room 24, ninth entry; heard a rumbling sound. They ran down to the main entry, but the heat was so great it took their breath; they made a hasty retreat on the main entry, but not before seeing dead bodies of four men who worked on a motor and whose bodies were stretched face downward with hands outstretched full length. Whalen states the one thing he can remember best was the awful feeling that the top of his head was being lifted off, the feeling being one of terrible agony. The son was using a carbide lamp, while the father used an oil lamp, which was extinguished by the force of the explosion, the other remaining burning.

"The Whalens ran back into No. 10 entry, where they found 40 other miners, mostly foreigners, who were crazed almost beyond control. By persistent begging they were made to go back beyond the trap door and get to work building good walls [across the tenth left entry and air course] to barricade themselves against the after-damp. They prepared themselves for the awful hours of awaiting death or the appearance of the rescue men, known to the miner as the 'helmet men.'

"Some of the foreigners wanted to smoke cigarettes and thus endanger all of them, and it was necessary to use force to prevent it. What worked a hardship that the other five men, who bratticed themselves in the ninth left, did not have to face, was that nearly all dinner pails were left in the main entry, and the only water available was polluted. Only once did Whalen moisten his lips. So great was the hunger and thirst of the entombed men that they would dig into the coal dust and get crumbs and egg shells thrown away at some meal, probably several days or weeks before.

"While they were waiting for the rescue men, in whom every man had implicit faith, they would take turns at waiting. Many would break down entirely, and but for the leadership of young John Whalen no doubt would

have broken down the wall. [On Friday it was decided to try to send out a man and a hole was made through the walls for the purpose. He carried out the written notice of the 42 men in the tenth entry, and left it at the mouth of the entry where it was found by the rescue crew. On his way back he was overcome by the afterdamp, but two others ran out and dragged him in through the barricades, which were sealed again.] The members of the rescue party was not heard until they were half way through the inner wall, and then young Whalen gave the order to start meeting them, and, according to Dad Whalen's testimony, little time was lost in complying with the order, despite the terribly weakened condition of the men. When asked how he felt when reached by the 'helmet men,' Dad replied: 'I can hardly remember anything, because I was so weak and nervous and the awful sight of my dead friends on every hand took by memory completely away from everything else in the world.' Dad Whalen is seventy-two years old, hale and healthy. He gave his interviewer to understand the fact that he was last out of the mine was not due to old age, but to his weakened condition, and further stated that he expected to be digging coal again within two weeks."

## SAFETY WORK OF Y. M. C. A.

In several cities the members of Young Men's Christian Associations have organized "Safety First" committees and entered enthusiastically into the safety movement. In Rome, N. Y., recently the chairman of a "Safety First" committee talked to the men of the Rome Brass & Copper Company and exhibited stereopticon slides.

J. M. Woltz, secretary of the Youngstown Council of the National Safety Council and safety director of the Youngstown Sheet & Tube Company, read a paper on "Safety Work as a Co-operative Measure" before the Pittsburgh & Lake Erie Railroad Y. M. C. A. at Hazelton, Ohio, on February 17.

He said: "We must have cooperation in the great work of safety. Not only is this true of the men in the organizations that are giving the best that is in them to the work at hand, but the same spirit should be manifested by the safety departments of the various plants and railroads. 'Safety First' is something that we should not permit to be commercialized. Anything that stands for the conservation of human lives, limbs and happiness is too sacred to be dragged in the dust of contempt and ridicule or made the sport of commercialized bargains."

The Southern Industrial Institute of the Y. M. C. A. of Charlotte, N. C., has prepared leaflets for distribution throughout the plants in the Southern lumber industry, giving particulars of first aid to injured workers.

## BUREAU OF SAFETY.

The Bureau of Safety, Chicago, has supervision and direction of the safety work of the Commonwealth Edison Company, the Public Service Company of Northern Illinois, and the Middle West Utilities Company, that have general offices in Chicago.

The safety organizations of the companies are arranged to include all of their workmen in proper groups, with officers from among the members. The groups have periodic meetings, reports of which are transmitted by the secretaries to committees of higher authority. Above the organizations of workmen are organizations of foremen, designated as intermediate committees. A central committee is composed of the active working heads of all of the departments.

The Bureau of Safety maintains a staff of lecturers, who devote their time to the instruction of the committees and organizations, and a corps of inspectors, who look after the elimination of fire hazards and mechanical dangers. Charles B. Scott, secretary of the accident prevention committee of the National Electric Light Association, is manager of the bureau. Associated with him are well-known safety workers, Alexander Shane, formerly chief inspector of the Railroad Commission of Indiana, and Samuel H. Reid, who has had wide experience in safety work.

# DUST AFFECTING SAFETY

AN EXCESS of dust has deleterious effect on the health and life of the persons who are compelled to work in it. Industrial diseases, causing loss of time, are frequently the direct results of impure air. Appliances for safety should be considered for the sanitary conditions of a plant, as safety devices are adjusted to the mechanical equipment for the purpose of protecting life and limb. "A sick man is as helpless as an injured one and ofttimes he is disabled for a longer period."

Dust may be dangerous because of its poisonous constituents or its explosive tendency, either of which may be the cause of loss of life, limbs, or property.

Dust carries deadly germs, breeds disease, affects the brain, lungs, eyes and causes headaches.

The Board of Health of New York City investigated the causes of mortality in its city and reported that "40 per cent of all deaths was caused by breathing impure air."

The owner of a plant in which an excessive quantity of dust is produced should protect himself and employes by eliminating it, for the following reasons:

It is always a source of revenue to him, representing, as it does, material saved, the better quality of work done by the employes and the saving in wear and tear of machinery and other property. He is better protected from loss by fire or explosion and the loss of men's time, due to sickness caused by inhaling impure air. A good practical dust collecting system is therefore a paying investment.

In 1912 1,769 cases of lead poisoning were discovered in 19 lead smelting and refining plants, employing 7,400 men as an average daily aggregate. Of the cases, 1,667 were reported by hospitals and physicians, a ratio of 22 to every 100 men employed, ignoring 102 cases reported by laymen. While more than 7.500 men were employed in the lead smelting industry in 1912, large numbers of men passing in and out at times, the number 1,769 is not the full total of men affected by the occupational diseases of the industry. Only two of the factories referred to keep full medical records. In four plants no information could be obtained.

Alice Hamilton, M. A., M. D., in her book, "Lead Poisoning in the Smelting and Refining of Lead," published by the United States Department of Labor, said: "Considering how little information it was possible to obtain in many of the plants, it does not seem an exaggeration to say that the number of cases found falls far below the truth, and that the record for the smelting industry in the United States for one year is at least 1,667 (to 1,769) men poisoned among 7,400 employed, about 23 per cent."

Men working in an impure atmosphere are committing suicide slowly, and the conditions cause so many discomforts that it is hard to keep them at work. Constantly changing help is expensive, because it costs something to break in a new man. One prominent plant claims that, since putting in a dust collecting system, the absence of employes has been reduced 85 per cent. Better work was obtained and more harmony and satisfaction prevailed among the employes.

Experience has shown that mechanical means are necessary to ensure the proper removal of dust. Wherever dust or fumes are formed locally, as, for instance, by tumbling barrels, grinding and polishing wheels, circular saws, furnaces, etc., the exhaust should be direct from hoods, enclosing the objectionable source as completely as possible. The design of an exhausting system is a matter that should be entrusted to an expert in that line and not to a local tinsmith, if efficient and economical results are to be obtained.

Data show that, by the installation of good ventilating and dust collecting systems in plants troubled with dust, the death rates have been reduced from 60 per cent to 5 per cent; in prisons from 80 per cent to 8 per cent, and in hospitals from 44 per cent to 13 per cent.

The elimination of certain kinds of dust removes the danger of explosions. In connection with that fact attention is directed to the report of the Millers' Mutual Casualty Insurance Company, pertaining to the industry of flour mills and grain elevators:

Sixty-seven cases of death and 1,380 of injuries were reported from March 1, 1912 to March 1, 1914, as caused by accidents in flour mills and grain elevators. Ninety-two per cent of the accidents resulted from carelessness. The annual average property loss from fire and explosion was $500 an hour. Explosions in the two caused injury or death in 117 cases, or 130 per cent more than any other cause.

The study of dust explosions was begun soon after an explosion in a feed-grinding plant in Buffalo, N. Y., in 1913. Thirty-three men were killed and more than 70 injured. Unfortunately dust explosions are too common. It is probable that when no loss of life occurs nothing is heard of minor occurrences. In the past year scientists have investigated and studied 16 dust explosions since 1905. Four were in cereal mills, 3 in grain elevators, 2 in feed mills, 3 in starch factories, 1 in a glucose factory, and 3 in flour mills. About 80 men were killed and 122 injured by the explosions. The property loss exceeded $2,000,000. The figures are sufficient to demonstrate that coal dust is not the only dangerous form of carbonaceous dust. The object of the scientific study in progress now is to discover some way of preventing the frequent accidents in grain mills, elevators and industrial plants.

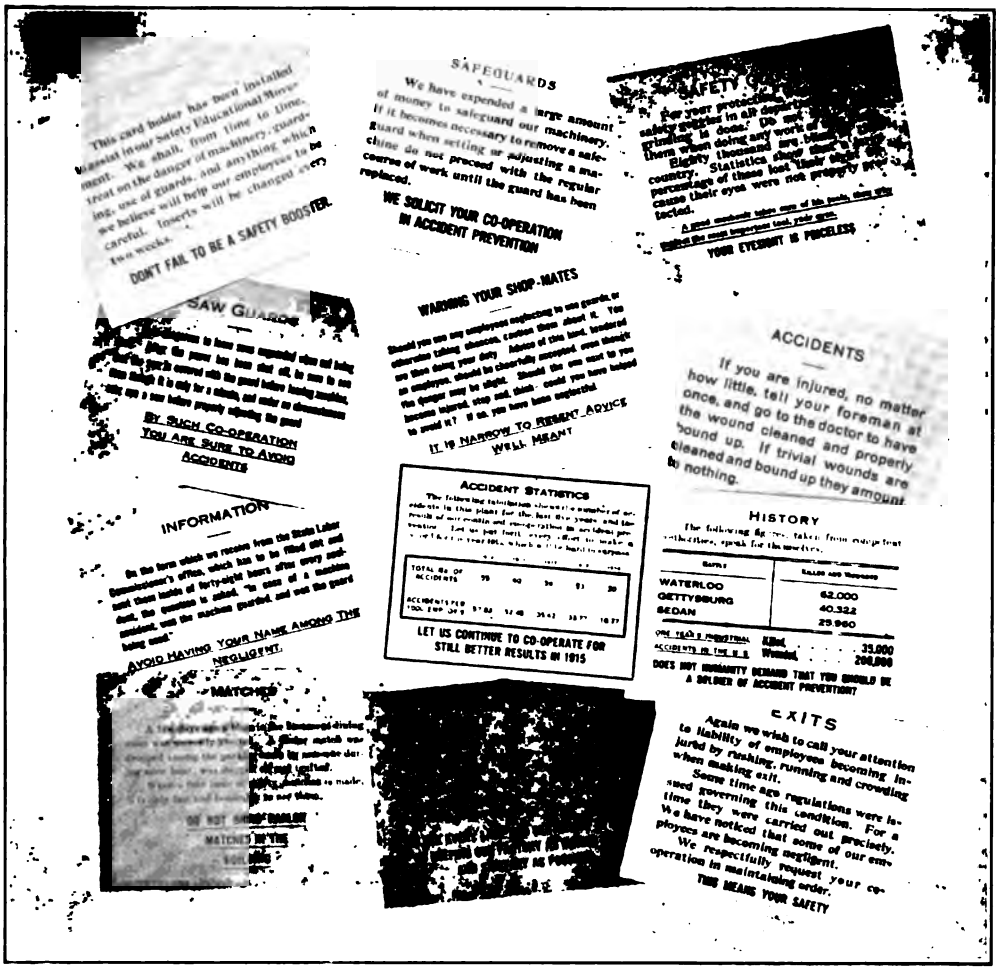
The report of the twenty-seventh annual convention of the International Association of Labor Commissioners, in Chicago, May 6-9, 1913, says: "The increasing number of States adopting laws to compel employers to install adequate ventilating systems shows that the importance of protecting persons, engaged in occupations which develop an excessive quantity of dust, from occupational diseases is recognized."

## ADVERTISING "SAFETY FIRST"

The American Car & Foundry Company believes in advertising "Safety First." In addition to other reminders used by the company to keep the safety idea before its employes, the admonition "Think. 'Safety First'" appears where all workmen can see it in the yards of the plant at St. Charles, Mo.

SAFETY SLOGAN ON FENCE

Courtesy American Car and Foundry Company.




Courtesy of Eastman Kodak Company.

**Cards of Information for Employes of the Eastman Kodak Company.**

Courtesy of Eastman Kodak Company.

**Card Holder.**

## CARDS OF WARNING.

About six months ago the Eastman Kodak Company, Rochester, N. Y., attached card holders on all of its machines, placed them throughout the plant where they would be conspicuous and inserted cards of information and warning. The idea was to keep before the employes one particular thought continuously for a certain length of time. Every two weeks cards on safety matters have been inserted.

Being of different colors, the cards attracted attention immediately, and the employes were interested by the reading matter; many of them memorized the

words. The expressed thoughts penetrated more deeply than they would have penetrated if posted on a bulletin board. The superintendents notice that the employes look forward to the changing of the inserts.

## SAFETY MEN.

"Safety First" may be a new movement, but there is a man no longer young, who claims an enviable safety record, the Columbus *State Journal* observes:

He is W. S. Taylor, of Galion, a fast passenger engineer, running on the Big Four between Galion and Indianapolis, who has completed 45 years' service with that road and never reported an accident resulting in injury to a passenger. He celebrated his seventieth birthday in February and a few days ago was retired from service on a pension with congratulations for his good record. For 26 years he has held the throttle of the most powerful and fastest passenger locomotives on the road, and was reluctant to retire. He started running a locomotive for a work train 45 years ago. In those days workmen camped out, sleeping in the cars. Mr. Taylor is a civil war veteran. He served two years as corporal in Company L, Second Ohio Heavy Artillery, and is now chaplain of Dick Morris Post, G. A. R.

The Boston *Herald* tells about another safety man:

Henry V. Neal, of Everett, the 66-year-old mechanic, inventor and poet, who was awarded the Anthony N. Brady bronze medal by the American Museum of Safety, has practised "Safety First" all his life. Not only has his personal carefulness kept his fellow employes from injury in the Albany shops of the Boston Elevated, but his patent protective devices have aided in rendering these shops one of the safest in the country. Mr. Neal has modelled his life from two verses learned as a child, the most significant lines of which are:

"Let us all help one another, and do the best we can,
Who withholds the hand of kindness, scarce deserves the name of man."

Mr. Neal has joined action and verse, until he is one of the most respected and popular men in the elevated shops. Mr. John Lendall, superintendent of rolling stock and shops, said of him:

"The matter of safety lies mainly in the hands of the men themselves. Mr. Neal has been of great aid in the 'Safety First' campaign, by instructing the men in personal carefulness."

It has always been characteristic of Mr. Neal to kick banana peels into the gutter, to remove dangerous tools, and to screen his fellow workers from harm. Born in Plymouth, Eng., he went into the shops of the Hinkley Locomotive Works, Boston's big industry, at the close of the civil war. He has worked on the Boston & Albany, and is now in the employ of the Boston Elevated.

"Mr. Neal has made a particularly fine record," said an elevated official, "in inventing devices designed to prevent injury from dangerous machinery, such as gears and saws." The Albany shops, when inspected, showed numbers of his inventions in use.

Mr. Neal has made little or nothing from his patents. He does not desire any reward other than that of serving his fellows.

## KNOWLEDGE ADDED TO ENTHUSIASM.

Enthusiasm alone will not make an efficient safety committee, but knowledge coupled with enthusiasm will produce results usually. In this respect the method of the Hyatt Roller Bearing Company of Harrison, N. J., is worthy of commendation. The company has started a class in first aid to the injured. It is planned to form a safety committee from the members of the class as soon as they have acquired the first rudiments of safety work.

## AMERICAN MUSEUM'S NEW QUARTERS.

The American Museum of Safety has leased the store and basement at 14 and 18 West 24th street, New York, for a term of years for the permanent exhibition of safety devices. The president is Arthur Williams, of the New York Edison Company; the treasurer is James Speyer, the banker; managing director, Dr. Tolman.

## SAFETY IN THE KITCHEN.

A cook in a large manufacturing concern, which supplied lunches to its employes, was accustomed to crack ice in the palm of her hand. One day the pick slipped, with disastrous results. Thereupon the safety committee "got busy" and introduced safer methods in the kitchen. Moral: The field of activity of a safety committee need not be limited to the workshop.

A head of a department cannot conduct it successfully so far as safety is concerned unless he be imbued with the safety spirit.—*J. J. Shanesy.*

# NATIONAL SAFETY COUNCIL

*IN THIS DEPARTMENT ARE ARTICLES AND NEWS REPORTS CONCERNING THE NATIONAL SAFETY COUNCIL AND ITS LOCAL COUNCILS, FURNISHED EXCLUSIVELY TO "SAFETY ENGINEERING"*

## PUBLIC SAFETY SECTION OF NATIONAL SAFETY COUNCIL.

IMMEDIATELY after the organization of the National Safety Council, then designated the National Council for Industrial Safety, its executive committee came to a realization of the fact that, while there was a great need for a federating, coordinating and stimulating agency in the industrial accident prevention field, there would be an equal need for such an agency in the public safety field as activity along public safety lines should develop and increase.

However, there had not been, nor has there been yet, in that field anything like the activity and progress found in the industries. On that account and by reason of the further fact that the membership of the National Safety Council was at that time almost exclusively industrial in character, the executive committee felt that its first duty and first obligation were to put its industrial work upon a sure and solid foundation before attacking the public safety problem.

It did, however, at one of its early meetings make provision for and create a Public Safety Section and appointed a chairman of the Public Safety Sectional Committee. Public safety activity throughout the country was, however, generally sporadic and in most instances not along definite, organized lines, so that the chairman of that committee was unable to make any very definite recommendations as to either the personnel of this committee or activity to be engaged in by it. Immediate steps were taken also toward the preparation of a "Safety Text Book" for school children, and there is now in the printer's hands a supplemental reader, called "Sure Pop and the Safety Scouts," which should be off the press within the next six weeks.

It was noted last year that there was developing an increased interest and activity in a number of municipalities along public safety lines and that many of the local councils were engaged in certain public safety activities, and the secretary of the National Safety Council, in the summer of 1914, was directed to investigate and to accumulate all existing data as to public safety activity, methods, schemes, plans, etc., and, although no sectional organization was perfected, the information has been disseminated widely among local councils and public service company members, and in many instances it has been of great helpfulness.

At the annual meeting of the National Safety Council in October, 1914, in recognition of the fact that one of the large purposes of the organization should be the fulfilment of the same functions in the public safety field as in the industrial safety field, the members voted unanimously to change the name of the organization from National Council for Industrial Safety to National Safety Council, and in the constitution and by-laws appropriate amendments were made to provide for such activity. Announcement was made of the early purpose of the National Safety Council to take up actively the public safety work through its Public Safety Section, in which the work of its local safety councils, public

service members and associate public safety societies might be federated and coordinated. Announcement was made also of its purpose to provide a Bureau of Information and other service along public safety lines similar to its industrial service, which had been demonstrated to be efficient.

Soon after the annual meeting a special sub-committee was appointed by the executive committee to canvass the entire situation, study the methods of organization and plans adopted in the various communities where public safety work had been carried on, and report to the executive committee its recommendations as to the best method of perfecting the organization of its Public Safety Section and selecting an executive committee and officers of that section, as well as to submit a draft of a bulletin for local councils and public safety societies on form of organization and activities to be pursued in public safety work. The committee has submitted a preliminary report, and it is expected that at the next meeting of the executive committee, on March 16, a final report will be submitted and acted upon.

In view of the items of the preliminary report, which were approved tentatively by the executive committee, it is probably safe to predict that a very strong public safety sectional executive committee will be selected by the executive committee or elected at a meeting of the members of that section, which committee, subject to the approval of the executive committee of the National Safety Council, will have general charge and supervision of the public safety activities of the National Safety Council and all of the public safety sectional meetings at annual congresses, and will also undertake to stimulate further activity throughout the country as well as to federate and coordinate existing and newly created activity, and supervise the collation and dissemination of all public safety data and information from time to time extant through the National Safety Council's headquarters as a general clearing house.

It is possible also that the issuance of a preliminary bulletin may be authorized to outline to local safety councils and public safety bodies suggested forms of organization, methods of securing cooperation, methods of financing and different forms of activity in the carrying out of a practical, constructive public safety campaign.

It will, of course, be understood that all public service companies, public safety societies and others interested in the public safety problem—members of the National Safety Council—as well as local safety councils, will be eligible to membership in its Public Safety Section and entitled to participate in all public safety sectional meetings.

In order to make possible the strengthening of local safety councils with respect to their public safety activities, the executive committee is recommending to the board of directors an amendment to the by-laws of the National Safety Council, which will permit local councils to include in their membership, as local members, persons who might not otherwise be interested in the industrial phase of accident prevention work, upon the payment by such local members of nominal dues to the National Safety Council.

Further and definite announcement of its plans is to be made by the National Safety Council after the next meeting of its executive committee.

## FOURTH ANNUAL CONGRESS.

THE Executive Committee of the National Safety Council has requested Secretary Cameron to announce that the fourth annual congress of the council is to be held in Philadelphia, on October 19-22, 1915. The details of hotel and other accommodations are to be announced later.

The tentative plan provides for two sessions daily, morning and afternoon, to include one business session; one general session for addresses, papers, etc.; one general "Round Table" conference; four sectional or special "Round Table" conferences; either one general session or "Round Table" conference and a banquet.

If the decision be to have the congress last three days instead of four, there is to be one less special or sectional "Round Table" conference, and the last suggested

general session or "Round Table" conference is to be omitted.

Sectional or special "Round Table" conferences are to be meetings at which special topics are to be discussed as of interest to separate groups, such as railroads, foundries, textile, public safety, etc., or particular safeguarding problems, such as crane protection, electrical construction, elevators, shafting and belting, etc.

Several of such sectional or special meetings could be conducted simultaneously in separate rooms, the topics not to overlap.

The Executive Committee directed the secretary to secure from the members of the council their views and suggestions as to the entire arrangement of the programme, including topics to be discussed at the general sessions, and the names of well qualified and desirable speakers who may deliver addresses at the general sessions; also topics for the sectional and "Round Table" conferences.

A small exhibit is in course of preparation to emphasize particularly the educational and organization aspects of accident prevention.

This congress should be a forum for the discussion of the latest developments in accident prevention work and an opportunity to seek light on old problems.

Address W. H. Cameron, secretary, National Safety Council, 208 South La Salle street, Chicago, Ill.

## YOUNGSTOWN COUNCIL NO. 2.

MEETING on February 16, at which twenty-one members were present. Mr. Evans acted as chairman.

The matter of memberships was discussed and ways and means were outlined to secure adherents. The question of expenses was held over for discussion at a subsequent meeting. A committee that had been appointed to investigate the collapse of the New Hippodrome reported that its findings were not ready for submission.

The members decided to have a dinner. Arrangements for it are under consideration.

A committee was appointed to report on "What is a preventable accident?"

E. J. Russert, claim agent of the Republic Iron & Steel Company, read a paper on "The Value of Statistics in Preventing Accidents and How to Record Them." Extracts from the paper:

The manner of recording accidents depends entirely on what you wish to show. A form used by my department is the daily accident report. This report, I believe, has done as much as, if not more than, any activity to interest the superintendents and foreman in the prevention of accidents. I show each superintendent how many men were injured, not only in his own, but in each department during the previous twenty-four hours, classified as minors, lost time and serious. Lost time and serious accidents are described in detail. Superintendents are requested to recommend means to prevent a recurrence of similar accidents, regardless of whether the accident occurred in his department or in the department of some other superintendent.

I believe the superintendents of our departments should be given reports monthly, semi-monthly and annually, showing the nature and extent of injuries sustained by their employes. The annual report should be a recapitulation, covering the year, with a diagram, showing the reduction or increase in the number of accidents, based on man turns, compared with a standard fixed by the experience of the previous year. A cause report should be made, outlining causes for all accidents during a given period and diagramed.

The question of reports as well as the question of reportable accidents should be taken up and disposed of finally. At present we are making reports to the Federal government, also to the State government; in several cases we duplicate reports to the Federal government. I think the time has come when this matter be taken and systematized. A report to the State government should suffice. The Federal government should get its reports from the various State departments.

It is my earnest opinion that statistics are as essential in accident prevention as in any other endeavor. Comparative cost sheets do not directly reduce the cost of production, but are the means of seeing at a glance just where costs are exceptionally high, and measures are at once instituted to lessen this cost. Similar reports having the same relation to accidents will call for the same effort in accident prevention.

J. M. Woltz, secretary of the council and safety director of the Youngstown Sheet & Tube Company, read a paper on "Safety Work as a Co-operative Measure," before the Pittsburgh & Lake Erie Railroad Y. M. C. A., at Hazelton, Ohio, on February 17.

## CHICAGO COUNCIL NO. 3.

MEETING in the rooms of the City Club on February 16. H. J. Bell acted as chairman. Motion picture films of the E. I. Du Pont de Nemours Powder Company, showing the use of explosives in pulling stumps, digging ditches, planting trees, etc., were exhibited.

Arthur T. Morey, manager of the Safety and Fellowship Department of the Commonwealth Steel Company, Granite City, Ill., spoke on "The Relation of Accident Prevention to Successful Business."

ACCIDENT RECORD CUT.—Mr. Morey said that the company had, by active safety work, cut the accident record 80 per cent in the past year.

He defined safety work as "the study of the right and orderly way to do things." He directed attention to the fact that a hazard prevented had a capitalization value. An interesting point was that the company's directors had established a fund of $20,000 for safety work in order to prevent the opposition of foremen to the expense for accident prevention which their departments might be forced to carry.

A. SAFETY WORK.—Mr. Morey said that the company had gone into the safety movement from a humanitarian standpoint; but later found that it was making a distinct financial saving. He made the broad statement that "the safety movement is one of the most humanizing elements that have come over this country. Don't approach safety work from a point of fear. If you approach it from a constructive point, you will do great things." He described the welfare work of the company, mentioning the luncheons and supplies for home consumption.

H. L. Brownell, safety inspector of the Chicago Surface Lines, showed new films of street car accidents.

J. P. Eib, assistant manager of the Department of Safety and Relief of the Illinois Steel Company, spoke of the duty which the manufacturer owes to society in the conservation of life and limb; and of the social effects of accidents. He gave interesting statistics on accident prevention work.

DISABLING ACCIDENT.—The question was brought up as to what should be considered as a "disabling accident"; and it seemed to be the consensus of opinion that an accident that caused seven days' absence from work should be considered as disabling.

Lew R. Palmer, chief inspector of the Department of Labor and Industry, Harrisburg, Pa., and first vice-president of the National Safety Council, spoke of the great advance that had been made in the reduction of accidents, especially in steel mills.

Howard Tilson, of the Workmen's Compensation Service Bureau, Chicago, referred to an insurance rating schedule to measure the accident hazard. He said that some companies were charging $1 for each protruding set-screw.

H. L. Gannett, inspector of safety and fire prevention, Commonwealth Edison Company, asked the opinion of the members as to whether bulletins should be of the "horrible-example" type; and Mr. Young, in answer, expressed the view that it was desirable to keep away from that type of poster.

Harry Guilbert, chief safety inspector of the American Car & Foundry Company, spoke on "Safety Goggles." He said the first thing to do was to secure the right goggle; the second, to get the goggle to fit the man; and the third, to grind the lenses.

H. P. Weaver, of the Independence Inspection Bureau, Chicago, led a "Round Table" discussion on the social and economic effects of accidents; and the methods that have proved satisfactory in getting workmen to wear proper clothing, shoes, goggles, and other accessories to minimize the accident hazard.

An inventor had on exhibition a machine for shifting photographs automatically.

## PITTSBURGH COUNCIL NO. 6.

MEETING in Thaw Hall, University of Pittsburgh, February 5. W. A. Hall, district manager of the Yale & Towne Manufacturing Company, spoke on "Safe Practices in the Use of Portable

Hoisting and Conveying Apparatus." Pictures were exhibited.

HOISTS AND CONVEYORS.—Consideration of hoists and conveyors was divided into four parts—design, chains, hooks and suspension. Chains for light hoists are of iron and steel. The steel chain, if worked correctly from proper stock, will not crystallize under load or shock, and it gives safe means of handling loads. The annealing of chains is therefore unnecessary. Annealing of chains, to be of any value, must be carried out carefully, or the overheating or uneven heating will cut down further the usefulness of the chain. Hoisting chains, as used on the hand-operated hoists, are subjected often to loads far in excess of their normal rating, and when so mistreated they are sure to elongate or break. If the former, annealing will not remedy the shape of the link, and it is still unfit for use over a chain-sheave; in the latter case, if one link is broken, it will generally be found that other links are stretched past the point where their usefulness in the hoist is concerned. The speaker said that the life of chains was increased sixteen times by being oiled at regular intervals. Hooks, bent under overloading, may be straightened; but it is perhaps well that they be discarded after being bent twice, as the alternation of stress in the piece tends to weaken it, introducing a chance for accident.

WIRE ROPE SLINGS.—A member said that his company had only a few chains in its plants. It had substituted wire rope slings for chains. The chains are annealed every two weeks; rope slings are inspected every morning. In case of failure, the chains snap without warning; the rope slings give notice of impending failure through the strands breaking one at a time.

FACTORS OF ACCIDENT PREVENTION MOVEMENT.—J. B. Ayers, superintendent of safety, sanitation and welfare at the McKeesport (Penn.) plant of the National Tube Company, read a paper on "Safety at the National Tube Works." He said that the safety movement started with the United States Steel Corporation from a humanitarian and not from an economic standpoint. The determining factors which caused the corporation to act along accident prevention lines were the conservation of life, the elimination of accidents and the loss due to the development of new forces.

Speaking of the great change in the iron and steel industry during the last 40 years, Mr. Ayers indicated that four decades ago there was no thought of the safeguards or safety methods which are considered necessary now.

TEACHING MEN TO THINK.—Provision for accident prevention is worthless unless followed by an educational campaign to make men think. Mr. Ayers was careful to draw distinction between an accident and an injury. All accidents are injuries, but all injuries are not accidents. The use of pictures is of greater value in safety work than printed notices. The illuminated bulletin boards used throughout the plants of the National Tube Company are large enough to exhibit broken tools, goggles, etc., as well as posters and photographs. The great value of group-talks to workmen was emphasized. At the talks, given by the foremen, only the workmen are permitted to attend. An effort is made to make the men feel that the success of the work of the Department of Safety, Sanitation and Welfare depends very largely upon them. The records of the National Tube Company show the following reductions in accidents: 1913, 44 per cent over 1912; 1914, 68 per cent over 1913.

To direct attention to the standing of departments in the record of the number and seriousness of accidents, a large blue-print copy of the plan of the company's plant is in a prominent location, and differently-sized red-headed tacks show the results for the preceding month. As Mr. Ayers put it: "The game is to keep your part of the plant free of even the smallest tack."

In response to a question as to what success the National Tube Company had in getting one man to report another, Mr. Ayers spoke of the merit and demerit system, which had eliminated all personal feeling.

The meeting was impressive, as the remarks compelled attention.

## PHILADELPHIA COUNCIL NO. 7.

MEETING on February 16. About 150 persons were present. Dr. Francis D. Patterson acted as chairman. He announced that in the past month 15 members had been added to the council.

Dr. John Price Jackson, Commissioner of Labor and Industry of the State of Pennsylvania, was introduced as the man who had brought "Safety First" into the State, and had made its principles permanent. Dr. Jackson congratulated the council on account of the size and personnel of the meeting and having Dr. Patterson as president. He referred to Dr. Patterson as a safety expert, known throughout the United States and abroad as a "live wire" and an authority.

WORK OF STATE DEPARTMENT.—Dr. Jackson told of the great work the State Department of Labor and Industry had before it in safeguarding the lives and interests of the employes of the Commonwealth, and analyzed the statistical report of the Department on Accidents, their causes and means of prevention. He described the work of organizing safety committees in large establishments, and the valuable assistance the Safety Council had been to his department in bringing about a cooperative spirit, that was so necessary in the accomplishment of his desires.

GREAT STRIDES FOR SAFETY.—After two safety films had been shown, Professor Francis H. Bohlen, secretary of the Industrial Accident Commission of Pennsylvania, told of the great strides the State had taken in the last few years for "Safety First." The larger plants were much easier to convince of the value of the safety movement, and they took hold of it, not only because of its humanitarian aspect, but because it meant dollars and cents saved, as proved by the records of the large steel companies. The work of the safety enthusiast is to show the smaller manufacturer or employer the means of economically eliminating unsafe conditions. The workmen's compensation bill, he said, will help to solve this question for the small employer.

He told the three points that Governor Brumbaugh asked the commission to consider in their recommendations to the legislature:

Safety.—Secure compensation; no risk as to the solvency of the employer.

Relief should be speedy, and simply and easily accessible.

The act should, as far as possible, be drawn to stimulate accident prevention throughout Pennsylvania.

One "Safety" film and two humorous reels (compliments of the Lubin Film Company) were run off to the enjoyment of the spectators.

## ROCHESTER COUNCIL NO. 9.

MEETING of the executive committee on February 15 in the rooms of the Chamber of Commerce. Eleven members were present. Dr. J. F. Forbes acted as chairman.

STREET SIGNS.—The sub-committee, appointed at the previous meeting to investigate the matter of circular metal "Safety First" discs, submitted a report. The consensus of opinion was that any signs at any dangerous street corners in Rochester should be 20 inches in diameter. It was then arranged to take proper steps toward recommending the proper size and the placing of such signs; also to ascertain how far the City of Rochester was willing to go in the matter of expense, and the number of signs it was willing to erect.

AUTOMOBILE OPERATORS.—A report by the sub-committee, appointed at the previous meeting to investigate a bill in the assembly, relating to the licensing of automobile operators, was presented. It was resolved unanimously to delay action on the report until it had been considered by Charles M. Tobin, secretary of the Automobile Club of Rochester, and the committee.

STREET PRACTICES.—The members voted to expend $25 to enable the programme committee to have a motion picture film of common street practices. Interest in public safety in the city is increasing rapidly .

The council had a successful public meeting on February 23.

## GRAND RAPIDS COUNCIL NO. 13.

MEETING on February 11. Twenty-five members present. E. A. Meves, secretary, acted as chairman.

SUGGESTIONS FOR SAFEGUARDING.—First topic discussed: "How to Go About Safeguarding." One speaker indicated that in general the ideas and suggestions for safeguarding came from the men themselves; very often from the operators of the machines. They go as far as to describe the kind of guard necessary. Such suggestions usually are acted upon favorably, except that a few minor changes might be made in the construction of the guards to overcome difficulties which could not be foreseen by the men.

REMOVAL OF GUARDS.—Another speaker maintained that, from his experience, he would not wish to take the suggestions of machine operatives in regard to safeguarding. He observed that the men did not want safeguards, and that, if the operatives were not watched, they would remove the guards. He instanced a recent example. He had a slippery place on the floor covered with felt to keep the machine operative from slipping and falling upon the machine. Investigating the precaution the following day, he found that the felt had been ripped off and cast aside, the operative, in justification of such action, maintaining that the felt "wore out his shoes too fast." The speaker expressed the opinion that all machinery should be safeguarded by its makers. The most opportune time for general safeguarding is when a factory is built. He suggested that belting should run below instead of above, because many accidents occur through falling belts, etc.

SAFEGUARDING REDUCES INSURANCE RATES.—In response to a query as to whether anyone had secured credit in insurance rates for satisfactory safeguarding of machinery, one member said that his company was threatened with an increase in the rate, amounting to about $5,000 annually, unless the company took up safeguarding and educational work along safety lines. It succeeded in avoiding the increase by organizing and establishing safety work. It had two or three reinspections by insurance companies' representatives, and each time a favorable report was made a reduction in the rates followed. The original rate was 1.65 per cent. It is now 0.506 per cent.

The chairman indicated that although his own company's expenses for safeguarding appeared rather high, on commencing the work, it had, since 1912, been able to reduce the insurance rate from 2.74 per cent to 0.55 per cent.

WARNINGS AT LOW DOORS.—Another member said that, to prevent men from striking their heads on some low doors, light chains had been dropped before the doors, warning the workers of the danger. The method has worked well. He also said that the home-made guards were the most popular; also that it was difficult to get men to use guards on machines where piece-work wages were in vogue.

FIRST AID.—The second topic discussed: "First Aid and Medical Attention." One member mentioned that at his plant every accident, no matter how slight, had first aid treatment. Men with minor accidents are attended to and then sent back to work; more serious cases are dealt with by a doctor; while in cases of grave injuries, requiring hospital attention, men are sent out on stretchers and an ambulance is summoned. Suitable first aid equipment is on hand at the plant for all minor casualties; and foremen have oil of cloves and other toothache remedies to prevent men from losing time and money through trifling ailments.

TREATING A WOUND.—Another member explained the modern way of treating a wound. Wash it with cold water; force the blood out freely; and, after thorough cleansing, apply a bandage. Great care must be taken to prevent infection.

SIMPLE REMEDIES.—Another speaker urged the use of simple home remedies for first aid work. In one plant the men came in contact with a strong acid, which caused serious burns on their hands, if not attended to immediately. The only remedy used was a mixture of turpentine and salt. Every man was required to carry a bottle of the mixture, and few

accidents resulted. The speaker deprecated the use of whiskey or brandy as stimulants subsequent to injury. Alcohol may interfere with the use of anaesthetics, if taken indiscriminately. Moreover an alcoholized condition renders a man subject to the ravages of blood poisoning.

PHYSICIAN'S ADVICE.—A physician outlined the elementary points in first aid work, and proved that it was the great issue of the day by furnishing figures, showing the number of industrial accidents in a year and the resultant losses. He said that the simple and most effective remedies for first aid work were: First, heat; second, bichloride of mercury; third, carbolic acid; fourth, alcohol. He favored the use of alcohol because it could be obtained easily and was easy to use. Boric acid and peroxide may be used, but their action is weak. He said that, if a person was not prepared to treat a wound properly, giving plenty of time to washing of hands, etc., it was better to bandage the wound and summon a physician. He remarked that first aid involves two factors—what to do and what not to do.

## NEW YORK COUNCIL NO. 14.

THE organization committee of the council at a meeting on March 5 decided to call a noon-day luncheon meeting of all of the members and representatives of the National Safety Council residing in the City of New York for the purpose of electing officers, adopting by-laws and completing other business arrangements to insure immediate activities of the council. The luncheon meeting was in the Biltmore Hotel on March 17. The hope is that the first general meeting may be in April.

The scope of activities of local councils of the National Safety Council is unlimited. There is not a phase of industrial, public or home safety that they may not develop as time and means permit.

MEETING FOR DISCUSSION.—The first meeting of the New York council is likely to be devoted to the consideration of some of the problems of industrial safety, including addresses by safety experts, and intimate discussions on the practical problems with which members and others are confronted day by day. Motion pictures and stereoptican slides are to be important parts of the programme. The expectation is that the executive committee will resolve to invite to the first programme meeting every person interested in educational and organization problems in accident prevention work.

The council will, therefore, provide a means for the representatives of the local industries interested in safety to meet and exchange experiences and ideas on their problems, and incidentally promote the national campaign for the elimination of unnecessary and wasteful accidents, which cost so much in money, pain and suffering.

CALL FOR ACTION.—The call for the noon-day luncheon was:

NEW YORK, March 11, 1915.

Please consider this letter on urgent invitation to meet your fellow members of the National Safety Council at a noon-day luncheon in one of the private dining rooms of the Biltmore Hotel (Room 103) on Wednesday, March 17, 1915, at 12:30 p. m.

As chairman of the Organization Committee of the New York Local Council, I will present to you for consideration the following:

(1) Proposed by-laws of the New York Local Council.

(2) The election of officers, chairmen of committees, etc.

(3) A suggested programme for the first general meeting of the members and friends of the New York Local Council.

(4) Such other business matters as may be necessary to bring about monthly meetings of the local council members.

It is believed, at least by some of the members of the National Safety Council in New York, that great benefits would be derived from monthly meetings and conferences on the problems of accident prevention, and it is the desire of the officers of the national organization that its members in New York City derive this benefit as one of the privileges of their membership.

The New York Local Council can be made to be of great influence in the community for increasing interest in safety and by providing a forum for the discussion and interchange of ideas and experiences for those who have already undertaken this important life-saving work. Similar activities in other large industrial centers have proven to be of inestimable benefit to the members of the National Safety Council.

The importance of a full attendance at a first meeting, such as this, cannot be too fully emphasized, and you are urgently requested to attend. In order that proper arrangements can be made with the hotel people, please advise the undersigned at your earliest possible convenience, either by letter or telephone, whether or not you can be present.

MARCUS A. DOW,
Chairman, Organization Committee,
New York Local Council.
Room 2846 Grand Central Terminal.

## WELL-GUARDED GRINDER.

Some desirable features are connected with the general construction and guarding of the grinder shown in the accompanying illustration, that might be copied to advantage by anyone on the lookout for the best. The sturdy base of cast

Courtesy of American Car & Foundry Co.

iron is home-made, and it will "stand up" to the work without vibration. It is "right on the job."

Note how well the ends of the shaft are protected with caps. The sheet metal wheel guards, riveted together, with the least gap possible for efficient working surface of the wheel, protect the operative from the danger of a broken wheel.

The manner of guarding the belt and pulley could hardly be improved. Notice the hinged door at the front for gaining access to the belt. Taken as a whole this is eliminating the hazard of a machine almost to entirety.

## SOCIAL HYGIENE.

The American Social Hygiene Association has been offered a prize of $1,000 by the Metropolitan Life Insurance Company, to be awarded to the author of the best original pamphlet on social hygiene for adolescents between the ages of 12 and 16 years, approved by a committee of judges to be selected by the association. Conditions of the competition may be obtained by addressing the American Social Hygiene Association, Inc., 105 West Fortieth street, New York City.

## INJURIES TO THE EYE.

*By Robert Ansley, M. D., in Inland Steel Company's Safety Bulletin.*

In the iron and steel industry there is a great deal of work done where eye injuries are apt to occur. Men working with molten metal in the blast furnace cast houses, at the pig machine, or at the open hearth are apt to have sparks and splashes of metal fly in their eyes and burn them severely. Goggles should be worn by all men engaged in this work. Men who are employed at chipping, working at grinding wheels, cutting cables, handling acid, etc., should also protect their eyes.

The injuries from small flying particles may not be serious, but sometimes they are. I have examined glasses worn by men working on pouring stands and at emery wheels, and have found them to be covered with small abrasions. The scars left by such abrasions can readily be seen on the surface of the eyes of those who have failed to protect their eyes.

Accidents may also occur through getting acids in the eye, and when this occurs the acid should be washed out with water as soon as possible.

# A WORKMAN'S VIEWS OF "SAFETY FIRST"

WE have all read and heard a good deal about "Safety First." If we have not, I am sure it has not been for want of opportunity. Employers have given a great deal of their time and thought toward spreading this gospel among their employes, and many bright men are preaching and teaching "Safety First." I am sure that whatever I may say will not be much different from what you may have heard or read. If it is, I beg you to read Elbert Hubbard's "A Message to Garcia," because Mr. Hubbard in saying that the average working man is a poor sort, and never need pride himself in being a very brainy fellow, has given me an excuse for saying things that perhaps could easily be proved wrong by men who make "Safety First" a study.

Recently I read an article wherein one of the most prominent "Safety First" workers said that thoughtlessness caused far more accidents than anything else. It seems to me that that is saying in another way what Mr. Hubbard says, for, whatever our faults are outside of our work, we will have the same faults in our work, and if we lack power for original thought we certainly will be thoughtless. Far be it for me to question anything that has been said by others, but, in my experience, many an accident has been charged to the fault of the workingman; a foregone conclusion that he had the fault, when it really ought to have been charged to bad example.

I railroaded for a number of years. One of the rules given me when I started was to never attempt to cut cars when they were moving, if, to do it, I had to step between them. I was sent out to switch cars with a man who, in the eyes of his employer or his agent, was one of the best men on the road, and that rule was a dead letter to him. I learned to break the rule. I broke it before superintendents, trainmasters and yardmasters. I never was called down once by any of them, but when one of the men, in making a cut in that way, lost an arm, he was charged with being reckless and thoughtless. Is it a fact, especially in the occupations classed as hazardous, that the man who could and would ignore the most rules, "get away with it" and, by so doing, do the work faster, was the man that often got the preference in so far as promotion is concerned? Most of the workingmen, that is, the average workingmen, have a secret ambition to get somewhere, to stand well in the eyes of their employers, or, better still, in the eyes of the man who controls their destinies, and when they see what is being done by the good man they will zealously follow his example. Is it thoughtlessness in the average workingman, if in so doing he gets hurt?

I have heard men, high up in the company I am working for, say that we must never break a rule to save time; that saving life and limb is far more important to them than saving time. It is up to us, fellow employes, to live strictly up to all the rules, but it is also up to the men in authority, or those under them, to classify as the good man the man who sets the best example in living up to the rules, all other things being equal. We, average men, being what we are, and what it is said we are, will never change our ideas of what goes to make a good man. It will have to be forced upon us, if I may say it that way. To live up to what "Safety First" teaches, will go far for us in decreasing accidents, but to reach the limit we must have good example.

At one time I worked on a log drive in the northern part of the country. The best man among us was the man who rode a log over the chute on the dam. Many attempted it, and, in so doing, one was drowned. The man that did ride the log over the dam was made foreman later. To stand well in his eyes, you could not be much of a disciple of "Safety First." Our employers felt badly over the accident; said that the drowned man should have known better, and he should, but making the other man foreman did not help matters much in preventing accidents, no matter how many rules.

To me it seems that a lot of rules, be they ever so good, will not go so far toward preventing accidents as will an example that is a living rule; and, say what they may of the workingman, I am sure that when the opinion of those who are better able to enforce their opinion changes in judging what goes to make a good man, the workingman will have brains enough to change his also; but the workingman will not be the first to change it.

It is certain that many accidents cannot be laid at the door of bad example. Inability to use the brains we, workingmen, have—it may be over-rating the brains we have—causes much hardship and suffering. To do away with that, we will have to dig down into ourselves. We never know our faults until we are told of them, and that is what the men who preach "Safety First" are doing, and it is up to us to listen carefully. They are doing it for our good, and, by applying what they tell us about ourselves, we will be better workingmen, better men.

In the clerical end of business there have always been accountants, or, in other words, fault-finders, going about preaching and teaching, digging up faults and correcting them. They have taken good ideas from one place and put them in operation at another and, by so doing, have reduced the number of mistakes wonderfully.

Many accidents among us men with overalls on are just mistakes. By listening carefully to what the "Safety First" good man tells us, the man that our employer sends to us, we will reduce the number of our mistakes.

We must remember that it is the hardest kind of a job to be able to truthfully say, "I know myself." Other people will always be better judges of you and me than you or I will be of ourselves, and therefore, if fault is found, it is up to you and me to correct that fault.

It is the nature of things that there will always be mistakes made, but the more they happen, the more we think they were ordained to happen. The fact that "Safety First" has made a considerable cut in them ought to be conclusive proof that accidents are not so much wished on us; that we ourselves are the origin of them. May we never forget that, no matter how good we are, we are never good enough, and that to get the beam out of our own eye before we attempt to get the sliver out of our neighbor's is a good way, perhaps the best way, of being our brother's keeper. Many a good movement has been spoiled, in that the position of the words in that saying have been reversed in the practice, and we do not want to make "Safety First" a failure. We know it is good for us in every way.

It is time for me to ring off. Before I do, I beg of you to remember that what I have said is the result of only one man's experience. I have no figures to prove that this and that is so; you will have to take what I have said for what it is worth and let it go at that. I am an average workingman, one of the many workingmen, and it behooves me, as well as any of us, to stop, look and listen. It is well for me, and might be for all of us, to never forget that through argument we may be able to convince someone; but to keep him convinced we will have to be up and doing.

If there is a doubting brother, we must make him come to the meetings, convince him that we mean business and, once convinced, keep him so by showing him that we mean to do what we say and expect the same of him. No one person will be the bainer; we will be the gainers. To be successful in "Safety First," we will have to go at it as a class and not as individuals. You learn from me, I learn from you, not what was thought good in times gone by, but what is good now for "Safety First."

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The manufacturer of machinery and appliances is in a position to prevent injuries by exercising foresight in planning against adverse happenings subsequent to wear and tear of the product turned out by him.—*J. G. Noack.*

I maintain that an illustrated rule book is the only type which will secure the best results; and I think everyone will agree with me that pictures are the best means of reaching the men.—*J. C. Smith.*

## A GOGGLE SQUAD.

The large group of workmen shown in the accompanying picture, all of them wearing goggles, proves that the claim that workmen will not wear goggles is not well founded. A workmen who will not wear goggles to protect his eyesight can find no fault with anybody but himself, if he becomes a blind man. Living the remainder of his days in darkness, he will regret that he was a "smart Aleck." But his regret will be a vain one, and his family will suffer but little less than he himself.

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## PROGRESS OF SAFETY.

Addressing a recent meeting at Grand Rapids, James A. Kennedy, of the Industrial Accident Board of Michigan, said that since the beginning of 1915, 46 workmen have been killed in Michigan and 1,600 workmen injured who came under the provisions of the Michigan compensation act.

Springfield, Mass., is placing in position street safety signs inscribed "Safety First, Cross Here."

Commissioner John Price Jackson, of the Department of Labor and Industry, Pennsylvania, addressed a "Safety First" meeting in Harrisburg on March 10, under the auspices of the Men's Bible Class of Immanuel Presbyterian Church.

Victor T. Noonan, of the Industrial Commission of Ohio, lectured on "Safety" at the Women's Exposition in Cleveland early in March.

Dangers from automobiles are receiving attention in many cities. The commissioner of police of Detroit, John Gillespie, fears that motor mail wagons will cause many accidents. He says: "I hear that the government is going to motorize its mail service in cities. If it does the Lord help us, that's all."

"Workmen consider it a disgrace to be injured in an avoidable accident," says the Indianapolis *News*, "and they do not hesitate to express their displeasure over a piece of negligence serious enough to demand a written report from their department to the superintendent's office. Something of the attitude of the men is contained in an article in SAFETY ENGINEERING, written by an employe who says 'We workingmen feel that the "Safety First" movement is a great boon to workingmen.'"

A safety convention is to be held in Fitchburg, Mass.

# "THE MAN ON THE JOB"

*COMPETITIVE ARTICLES RELATING TO THE PREVENTION OF INDUSTRIAL ACCIDENTS BY EDUCATION OF WORKMEN, METHODS OF MANAGEMENT AND MECHANICAL SAFEGUARDS*

*Conditions of competition published on page 264.*

## ANNOUNCEMENT.

*Beginning with an early number, articles in this department are to be devoted frequently to safety work in particular industries. In one of the early series, safety work in electric light, power and gas companies is to be discussed. On committees to award prizes and review articles, the industries under discussion will be represented largely. Contributors are requested not to exceed the limit of 750 words. Articles may treat safety work in general or particular features. The editors reserve the right to make a selection of articles to be published.*

**No. 155** MAKING THE MAN ON THE JOB THINK.—"The Man on the Job" has proved his ability to do much in behalf of the "Safety First" movement. By his efforts he has reduced industrial accidents 40 per cent in two years, but few of the men on the job give the fact more than a passing thought, not realizing what the sum total means. That 40 per cent in the United States would be men enough, counting those dependent upon them, to form a city as large as Memphis, and the cost of settling the accident claims would be sufficient to finance such a city. The reduction of accidents has been accomplished by two simple words—"Safety First."

The result is enough to arouse a careful man on the job, but something more is required to arouse the indifferent man; it requires something more impressive than "Safety First," something that will speak volumes at a glance, and for this I suggest a "sticker," portraying a man, mangled and torn, before his bereaved and dependent family. The picture would make every man think of himself and his family. When men think industrial accidents can be reduced another 40 per cent in six months.

It is possible to make the man on the job think, as it is possible for a manager to transfer energy to each man, if he knows how to reach the man. The manager of the claim department of a railroad that has less than 4,000 miles of track appealed to his men to reduce accident claims $100,000 in eight months.

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**No. 156** SAFETY REGARDING ELEVATORS.—"Safety First!" These two simple words have come to hold the attention of every efficiency engineer. They have put on our statute books laws that compel those in a responsible relation to devices or employments that have to do with accidents to take every reasonable precaution to insure the safety of their employes and of the public.

Almost half of the States in the Union (twenty-four to be exact) have compensation acts, which have greatly increased the cost of accident settlements.

In several other States, commissions, appointed by legislative action, are considering methods that will give a reasonably just compensation to those who may be injured in the course of their usual employment.

Experts who have studied working conditions say that three-fifths of the accidents that occur in the United States can be avoided. If this is true, it becomes a matter both of economy and humanity to install adequate safety devices and adopt practical preventive regulations.

Through the installation of safety devices and the enforcement of rules, one large corporation reduced the number of accidents 44 per cent in the year 1912. The United States Steel Corporation issued recently a chart, showing that, in its extremely hazardous operations, the number of accidents had been reduced 43 per cent in the past six years.

Increasingly the managers and superintendents of industrial plants are beginning to be alive to the need of safeguards for the people employed in the various departments.

While the modern office building, hotel or apartment house is free from many of the dangers that surround an industrial plant, yet, "Safety First" cannot be ignored without disastrous consequences. Safety in building construction goes deeper than the foundation, farther than the selection of the steel, and, beyond the employment of careful operators, it means especially that the elevator equipment must not only be adapted to the requirements of the tenants, but that it must be of such type that the human factor in its operation may be practically disregarded. True safety is foolproof.

The owners of modern buildings require of an elevator a minimum operating expense. The surety companies insist that safety be considered at all times. The tenants demand rapid and efficient elevator service and they are "on the job" all the time.

Thus the perplexing and contrary problems of speed and safety and economy are always before the elevator engineer, with the result that numerous safety devices have been invented for elevators.

One of the most important devices is the safeguard for hatchway enclosures and doors, and no elevator safeguard can be considered completely and thoroughly efficient unless the gate on the elevator itself, known as the "car gate," is included. The installation that includes the car gate marks the highest degree of safety that can be offered to those who use elevators for any purpose whatever. It protects the passenger in an overcrowded car from being pushed against the side of the shaft, and it is a safeguard to the man or women who may faint, or may be taken suddenly ill, and thus become practically helpless. A short time ago a prominent New York attorney fell in an elevator car and before the operator could shut off the power, he had been caught between the car floor and the wall and killed. While no responsibility could be fixed for the accident, the fact remains that a car gate would have prevented it, and thus have extended the life of a useful man. There are many other safety devices used in elevator installation, but to the writer's way of thinking, the car gate is an important factor in the safety of every passenger elevator.

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**No. 157** DIFFERENCE IN LANGUAGE AS A FACTOR IN ACCIDENTS—Difference in language has not been given sufficient consideration as a factor in accident prevention. This was demonstrated to me on one occasion when a chain block was in imminent danger of falling on a Polish workman's head. His foreman shouted; the Pole did not understand the warning; there was no time to explain, and the result was a fractured skull. Investigation showed that the English speaking foreman had a large number of Poles working under him for a considerable time, but he had not gone to the trouble of learning the few phrases that would have made him a more efficient boss. This incident led to a study of the situation, and it was discovered that about 85 per cent of the workmen were Poles, and some foremen had an exclusive force of Poles under them.

It was found that the language necessary to be used between foreman and

workmen was confined to a very limited number of phrases which for all ordinary purposes could be classified under these headings: Salutation, Command, Approval, Warning, Direction, Inquiry. About four phrases, which will readily suggest themselves, were selected, and a card was prepared, with one side for the foremen and the other for the workmen. For example, on the side for the foreman was the English phrase "I have no time." Beneath in Polish, pronounced phonetically in English was "Nye mam chasoo."

On the side for the workmen was the phrase, in correct Polish, "Nie mam czasu." Beneath was the English, rendered phonetically into Polish: "Aj haw no tajm."

The phrases are in vertical columns under the headings so that a foreman who keeps the card in his vest pocket can see at a glance the phrase he requires. Reiteration familiarizes him quickly with the contents of the card, and if he adopts the habit of first using the English and then the Polish equivalent the men will gradually come to understand the English. Thus the gradual education of the workman is accomplished, and if the cards are distributed among those who can read they get a chance of familiarizing themselves with all the language they are likely to need in their work. This plan will be found of far more practical value to the employer than any which involves night school attendance.

This principle of instruction can be expanded indefinitely, applied to any class of factory, any language or any condition of employment in an industrial occupation.

**No. 158**

HIS BROTHER'S KEEPER.—Accident prevention by a rigorous campaign of elimination has practically reached the stage where the education of the individual workman must, and will, play an important part in accident reduction in the future. Manufacturers in all lines have expended time, energy and large sums of money to make machinery as near foolproof as possible. Despite all the care, caution and expense, needless and, in many cases, foolish accidents are happening every day.

The safety inspector turns to education as the solution, and rightly so. But how are you to educate a man to the hazards of a new occupation, when he may, and likely does, receive an injury before the company has the time to give him the proper education?

For example, a few years ago, in one of the large steel plants, a foreman put a new man at work loading ashes at an ash conveyor. The duties of the laborer were to keep the car moving, as the conveyor filled it, the car being on a gravity track. When the end of car was properly loaded Mr. New Man "pinched" the car down the track to the proper spot, only to find he had nothing with which to block or stop it. So he used his right foot. Results: Crushed and lacerated foot, amputation. Was it lack of education on the part of the new man, or was it lack of education on the part of the foreman who put the man at the ash conveyor?

The foreman was surely to blame. He placed a new, inexperienced man on a job which required quick thought and action. So much for the foreman. How about the company? The company could not educate the man; the safety department had no chance; but they could educate the foreman in the proper placing of men, or better still, exercise more care in selecting foremen. The poor, inexperienced foreigner, created dull of wit, is the loser, and he must carry his loss till the grave claims him.

After all, it appears to the writer that, while the knowledge of the safety rules is essential, safety discussions and things that will keep "safety" uppermost in the mind are good. The real results are bound to come from the foreman, who will take the new inexperienced men and the men who are dull of wit, the slow thinkers, and place them out of harm's way and make the experienced, quick thinking, quick acting workman assume the more hazardous positions.

In short, the foreman must know every man working under him and be at heart his "brother's keeper."

No. 159 SAFETY FIRST FROM A WORKER'S POINT OF VIEW.—The natural law, that every effect must necessarily be preceded by a cause, suggests to my mind that the only ideal method of combating any ill effect is to penetrate the primary cause and make it the subject of earnest investigation. New industries, inadvertence of the worker, fallibility of machinery, inadequacy of safeguards, exhaustive periods of labor, combined with the speeding up system and the employment of insufficiently trained men in hazardous positions, may be enumerated as some of the determining causes that tend to increase preventable accidents.

To promote and keep up conditions most conducive to safety requires indefatigable effort on the part of the employer and employe; in other words, the only effective method to attack and solve this problem lies in intelligent cooperation.

It is an undeniable fact that cooperation founded on coercion or sentiment will never be attended with gratifying results; it should be recognized solely as a cold business proposition, and I believe it is a grave mistake on the part of employers to accentuate the idea that their interest in this salutory work is prompted alone by humanitarianism. It would be equally absurd to expect that the employe would develop an attitude of interest for the sole purpose of husbanding his employer's resources. The incongruity of either statement would tend to destroy confidence.

Economy is the ruling motive in this movement; one has property and interests to protect; the other life and limb. It requires no acuteness to determine that a loss of time due to an accident to the worker reflects on the employer; but I must draw a very necessary distinction in regard to the nature of the loss sustained. For one the loss is measurable and retrievable; for the other, inestimable.

I have strong reasons for believing that the enforcement of workmen's compensation laws has been a potent and impelling factor in the "Safety First" movement. Employers of labor are confronted with the alternative of prevention or compensation. A careful analysis of statistics brings the fact that it is wiser and cheaper to spend money to prevent accidents than to settle claims and repair damages; hence the employer's zeal in giving impetus to this movement.

It is the duty of every employer of labor to make working conditions safe and congenial, because the resultant effect would not alone show a diminution in frequency of accidents; it would serve to increase the efficiency of the organization. One piece of advice, that needs to be reiterated emphatically, is the importance of enforcing safety rules. Only the inflexible rules possess value.

In the installation of safeguards one must be governed by the possibility and not the improbability of the occurrence. Mechanical safety devices should be made fundamental parts of all machinery. It is poor economy and, in fact, an inexcusable violation of safety rules to permit the use of caution notices or danger signs where mechanical devices are available. A safeguard is a prime requisite, because it protects and because it has permanent value; a caution placard is a complimentary measure; it merely warns, and its usefulness is lost when it fails to arrest attention.

The plan of "Safety First" meetings should be encouraged to give to workers opportunities to absorb new ideas, exchange experiences and discuss dangerous conditions; but, in order to popularize the meetings, it is more prudent to invite rather than to demand attendance. It is impossible to make a man think thoughts of safety, if he has no conception of the penalties that arise from taking chances; but I am convinced that, when the advantages of the safety movement are made clear to him, he will be anxious to take part in his own education.

Employers should install bulletin boards and post the details of all accidents. Of course, it is hard to think that our benefit will come through misfortune to others; nevertheless it would have a wholesome effect, because reading stimulates thought and thought governs action. I would recommend also the use

of motion pictures to depict scenes of accidents. It is needless to say the exhibition would not portray pleasant or agreeable views; but where one has the opportunity of visualizing the scene the lesson conveyed would be impressed more indelibly upon the mind.

I believe in placing the blame for accidents where it belongs. Where the employer provides every means within the limitations of human skill to guard against accidents, and the employe fails to utilize them, or in other respects is guilty of a contravention of rules, the employe would be open to censure, but where the defense is weak or inadequate the employer should bear the burden of reproof. It is no mental task to assign the cause and attach the blame, but it is some achievement to devise means to frustrate the cause before the irreparable damage is done.

The indisputable fact that the worker bears the brunt, endures the misery and experiences the distressing effects in all accidents ought to make this proposition of sufficient interest to arouse his determination and willingness. He should give this movement serious thought, because, by reason of his position, he is essentially a directing spirit; it is from his mind and experience that the most helpful suggestions emanate.

Many accidents can be attributed to the weaknesses of humanity. Among them are carelessness, over-confidence, absentmindedness; they are usually habit formed failings, and I venture the opinion that with earnest effort they can be overcome or at least modified. A careless worker is unsafe; he lacks method, uses no precaution, and is not sensitive to the thought of the consequences of a blunder. An over-confident man may appreciate the danger, but he over-estimates his ability, fails to consider the possibility of a miscalculation, and becomes imbued with the idea that he can perform dangerous operations indefinitely. Take a worker whose faculty of concentration is lamentably deficient; his mind is diverted easily and in the oblivious state he is liable to expose himself to injury.

Man has eyes to survey conditions and brains to analyze them. Why not exploit the two natural means of defense? Why do seemingly preventable accidents occur? Is the instinctive trait of self perservation drifting to decadence, or have the chances for mishaps multiplied? It does not require much of an observer to fathom the actual situation. Accidents cannot be eliminated entirely, but I feel safe in saying that, with the earnest cooperation of all concerned, the situation can be improved materially.

## PRIZES FOR FEBRUARY ARTICLES.

*First Prize. No.* 150. *W. H. Aldrich, Superintendent of Inspections, Southwestern Surety Insurance Company, Denison, Texas.*

*Second Prize. A tie. Nos.* 149, 151 *and* 152. *Henry U. Miller, Safety Inspector, Aetna Life Insurance Company, Detroit, Mich. Robert H. Fulton, Jr., United States Aluminum Company, New Kensington, Pa. R. W. Robinson, Inspector, Ocean Accident & Guarantee Corporation, Ltd., Philadelphia, Pa.*

*Honorable Mention. A tie. Nos.* 153 *and* 154. *Walter I. Sweet, Safety Inspector, General Accident, Fire & Life Assurance Corporation, Ltd., New York City. Allen F. Hackett, Employment Supervisor and Secretary, Safety First Committee, Rochester Button Company, Rochester, N. Y.*

## COMMENTS BY MEMBERS OF THE COMMITTEE

No company or organization of any kind doing business in this country on a sound basis but what has studied the cost of the article produced. How many are there that can give any intelligent information about the cost of accidents as related to the annual output? Yet this matter of accidents is governed by a rule of average and is susceptible of analysis, just as any other element of business, if properly studied. Education is the keynote, and No. 149 has struck it. Accidents are or should be unusual happenings, and education consistently

followed out will eliminate them. My vote goes to No. 149.

I am choosing No. 151 for first prize. While the writer confines his article to one subject, he comes out so clearly and fully that one cannot fail to appreciate it. His suggestion for the safety of men employed at crane, chain and blocks and block work are timely and worthy, and will be of much value to employes and employers, if the suggestions for safety which he makes are followed.

It is my judgment that the writer of article No. 150 is entitled to first prize for his clearness of expression and for his understanding of the fundamentals, which are very essential to a proper application of "Safety First" methods. There must be an intelligent understanding between employer and employes; good feeling must prevail always. In other words, a personal equation is necessary for a proper application of safe and efficient methods in any plant. A house must not be divided against itself, but employes must understand that there is a duty incumbent upon them, which cannot be overlooked and which they cannot afford to neglect. This is brought out clearly in article No. 150. "The Man on the Job" articles have been interesting.

I have decided that No. 150 shall receive my vote for the first prize. The following items show that the writer of this article is familiar with some of the most glaring faults to be found in shop practice, and, by his careful explanations, he has shown how such faulty conditions may be remedied. I will mention a few of them: Modern, antiseptic means of caring for, and wrapping of wounds, as against the too often past practice of using the first rag that might be the handiest to reach. Selecting responsible foremen who are capable of filling the position for which they are chosen. Enforcement of rules. Attractive signs. Encouragement of prompt and efficient work, by placing an extra slip in the pay envelope, an open letter, or a heart to heart talk. I find pleasure in praising the article I have chosen, and feel sure that all the other readers will be glad to hear often from our safety friend in other issues of your valuable magazine.

The writer of No. 150 receives my vote, as his article shows a general knowledge of accident prevention work, and offers a number of good suggestions to be used in a safety campaign.

"Consider nothing so much upon every occasion as safety." That is the keynote in reducing accidents to a minimum. If every man and woman would have "safety" upon their minds at all times, the inspectors' work would be easy. I cast my vote for No. 149, as I consider his article the best, although the others are exceptionally good.

My vote is cast for No. 151, because the article points out a greater number of cases where bad practices can be cor-

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*SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The prizes are awarded for articles describing or explaining Practices, Methods of Management or Operation, Regulations, Systems, Recommendations, Suggestions, Ideas, Safeguards, Safety Devices, or Apparatus. The Committee of Award will be influenced, in each case, by the evidence which the article gives of its writer's knowledge of and interest in accident prevention in general, as well as by the practicability and range of the concrete suggestions made and, in cases where these suggestions are peculiar to some particular industry, the understanding shown of the hazards of that industry.*

*The merits of all articles will be passed upon by a Committee composed of Safety Engineers, Managers, Superintendents of Plants and Workmen.*

*Drawings, sketches and photographs are invited whenever they will aid or supplement the descriptions in articles.*

*Contributors are requested to be as concise as possible. The competition is open to everybody competent to write on the subject without the requirement of a consideration of any kind for the privilege of competing.*

*Blanks upon which to submit articles will be furnished on application, but any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

rected than any of the other articles. What is wanted in the campaign of education is a knowledge of methods and appliances for preventing accidents more than essays that are intended to arouse employers to a proper sense of their duty. Employers of labor generally are practical sort of "cusses," and we all know that, if shown how, they will do the right thing.

I choose No. 150, as it outlines an excellent method of safety organization, which may well be followed by all industrial concerns. The author shows that he has a thorough knowledge of the subject and offers excellent, practical suggestions for "Safety First."

The writer of No. 150 has written a splendid article in defense of the "Safety First" movement and has given us a working outline for the handling of this work. He realizes that the time has come for the safety movement to settle down onto a solid rock foundation and that much of the hurrah is a thing of the past. Like all great movements, it has come to this stage, and from now on will be conducted with much common sense. I give my vote for the article.

No. 150 has an excellent article on the duty of a safety engineer. I vote for No. 150 for first prize.

No. 152 on safeguarding a plant receives my vote for first prize. This article was written by one who, no doubt, has had actual experience in safeguarding, and takes great interest in the work. Today in the business rush an inspector must be trained in reading human nature, be broadminded and be able to show that every guard installed is money saved for the firms.

I believe No. 154 is the best, because it states in concise language a successful safety campaign, which, if every manufacturing company would follow, would reduce accidents to the lowest minimum possible. I believe the putting of men who show antagonism toward the safety movement on the committees is a very good idea. For second prize I favor No. 153. Getting the right man for the job of safety inspector is very important, for I know of plants where the right man was not selected, and as a result the safety work has not received the attention it should.

The writers in the March number have such splendid articles on live topics that it is hard for me to make a decision. However, I favor No. 150. It seems to me that if SAFETY ENGINEERING could be placed in every shop and factory for all to read there would be less accidents.

No. 152 is my choice for first prize, because the man who wrote it knows his business.

My first choice is for No. 150 and second choice for No. 154.

I cast my vote for No. 153 for first prize.

My vote is for No. 152 for first prize. This inspector seems to have the right idea with reference to standards and the advantage of applying same in all cases.

The advice given in article No. 150 is thoroughly practical. If an employer, knowing nothing about the subject, would act on the suggestions contained therein, he would get very good results in a short time. The principles laid down cover the ground very completely, and they can be applied to almost any kind of factory. My vote therefore is for No. 150.

Article No. 150 is exceptionally well written, and I believe the writer to be well versed in accident prevention.

The general tone of the article is imbued with the "Safety First" spirit, so essential in this great humane cause. No. 149 is well worthy of second place.

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It is a hard matter to pick the really best article in "The Man on the Job" department. After reading all of the articles a couple of times, I have selected No. 150 for first prize, more perhaps because it reflects some of my own experiences and troubles and triumphs as a safety engineer. For second prize I believe that No. 153 ought to have a chance.

## BELT GUARDS ON WOOD PLANER

Anyone who has had to do with a wood planer or surfacer knows what a mess of belts there is to contend with. It would seem to be an almost impossible job to guard properly all of the belts. A glance at the accompanying illustration shows how one man went about it, and how successful he was.

Courtesy of American Car & Foundry Company.

**View shows manner of attaching guards and how easily they can be removed.**

The motor, at the right, is enclosed in a sheet metal casing. The belts are enclosed in guards of wire mesh so that they may be seen easily and their condition noted. The pulleys are guarded with sheet metal guards, which may be removed easily when necessary. Note the handles for the purpose. Note also that the small doors, directly over the pulleys which drive the belt to the knife arbor, are hinged for easy access.

## DECISION ON SAFETY FEATURE.

In a case on appeal to the United States Circuit Court of Appeals to determine the priority of a safety feature in the construction of freight elevator firedoors, Judge Lacombe handed down a decision in favor of the Peelle Company, of New York, appellant, reversing the decision of the lower court.

The mechanical feature, as the subject of litigation, is a truckable surface, whereby the upper edge of the lower half of a counterbalanced door is reinforced and supported even with the floor of a building and the floor of a car.

Freight handlers and others have been injured seriously by the throwing of heavy merchandise from trucks that passed over the open spaces between the floors of elevator cars and the floors of buildings.

## SHEBOYGAN ROUND TABLE.

"Great enthusiasm," says the Sheboygan (Wis.) *Press,* "marked the organization of a 'Safety First' Round Table in this city at a big meeting on March 2. More than 150 men composing one of the largest bodies of machinists, engineers and mechanical men that ever came together to discuss safety questions were assembled. C. W. Price, of the Industrial Commission of Wisconsin, was the principal speaker."

Thoughtlessness, not carelessness, is the cause of most accidents.—*R. C. Richards.*

# "THE FIGHT AGAINST FIRE"

*COMPETITIVE ARTICLES RELATING TO THE CONSERVATION OF LIFE AND PROPERTY BY FIRE PREVENTION AND DEFINING FAULTS OF CONSTRUCTION AND HAZARDS OF PROCESSES*

*Conditions of competition published on page 271.*

## QUESTIONS AND ANSWERS.

*Subscribers to* SAFETY ENGINEERING *are invited to ask questions on any phase or problem of fire prevention or fire protection. This includes construction and equipment of buildings, installation and use of apparatus, fire dangers peculiar to industries, etc. Questions received will be published each month, with request for replies by engineers, inspectors, officials and others interested in the subjects presented. If too long for publication, replies will be forwarded by mail direct to the inquirers. It is believed that, by this method, subjects on which there is a desire for special information will be developed. It will also put the authors of articles in touch with inquiriers who wish further information on points merely touched upon or not made wholly clear in published articles.*

**No. 47** SPONTANEOUS COMBUSTION.—This is a term which is used often, but to the average man or woman its exact meaning seems to be far above his or her power of understanding, and all writers on this subject seem to prefer to discuss the matter from a scientific standpoint rather than from a point of common understanding. In simple language the term "spontaneous combustion" means "self-generating of the oxidation of a substance with such a rapidity as to produce sufficient heat to ignite it," and, to be more simple in the meaning of the term, would be to say, self-creation of heat sufficient to ignite the gases thrown off by the heat created.

The causes of spontaneous combustion may be attributed to many things, but the principal ones which cause so many fires are the simple ones, and it is their causes and the method of prevention which I wish to discuss in simple language in order that the fire waste from this source may be eliminated.

One of the most common causes of spontaneous combustion is in the use of floor and furniture polish rags, which are saturated with vegetable oils, and after use are thrown into some dark corner, under a stairway, in a closet, an attic or a basement, and there left until sufficient moisture accumulates to cause the same to heat, and as a result it ignites and causes a fire which destroys the building. By burning rags and cloths used in painting or floor and furniture polishing it will eliminate many of the fires reported from unknown causes. Always keep cloths saturated with vegetable oils out in the open air when not in use. The oil mop should be treated in the manner as oil rags. The careful housekeepers have few if any fires.

Many barns and storage buildings are burned by the combustion of hay and grain, which being stored before it is properly dried, or becomes damp from some other source, generates sufficient heat to ignite the gases thrown off from the vegetable matter and thus starts a conflagration. Whenever hay or grain begins to show any indications of heating, it should be moved, aired and dried.

Sulphur and charcoal are two substances which will ignite within themselves, and they need no moistures of other substances to make them combustible. For this reason safeguards should be at all times thrown around the two substances.

The last subject, which I will discuss from a spontaneous combustion standpoint, is soft coal. It is one of the most dangerous, for the reason that few people have ever given a passing thought to the danger that lurks within the coal bin. Within the past year more than a half million dollars' worth of property, which has come within the scope of my knowledge, has been swept from existence due to fires which have been caused by coal. Coal should never be stored in large quantities in basements or places where the air can not circulate freely about it, and it should be perfectly dry when stored in any building. To prevent the combustion of coal, ventilation pipes should be placed through the coal admitting a circulation of air which will assist in carrying off the gases as they accumulate, should the coal draw sufficient moisture to cause the same to heat. If coal is found to be heating it should at once be moved. If these suggestions are carried out many large buildings will be saved from destruction and our ash heap will decrease.

Spontaneous combustion can be attributed usually to carelessness or ignorance. With the proper regulation and education it can be almost entirely eliminated.

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**No. 48** LUMBER YARDS, CITY AND COUNTRY.—A fire in a lumber yard is one which can do great damage, cause loss of large sums of money, and be the means, directly and indirectly, of throwing many out of employment; therefore too much cannot be said in regard to fire prevention in such places.

Fires start in these yards from a number of causes, among them being fires in immediate vicinity sending fire brands into the piled lumber, sparks from railroad locomotives, smoking, incendiarism, etc.; therefore the utmost care should be taken in the location of yard, the hiring of employes, the mode of storage, cleanliness and fire appliances.

A lumber yard should not be near a business carrying on a hazardous occupation; should be about 100 yards from railroad tracks and as isolated as possible.

The employes should be well selected, for, should an employe become dissatisfied and fail to do his work properly and be discharged, he could, if so inclined, cause much damage with the aid of a match.

The piles, not stacked over 15 feet high, should be packed solid; piles should be separated every 10 to 20 feet, with a passageway wide enough to allow room to work in case of fire.

In regard to cleanliness, all chips, waste papers, etc., should be raked up each day and the chips should not be used on the roadway.

The fire appliances should be, where possible, fire hydrants, about 300 feet apart, with hose and nozzle attached, a 40-gallon chemical fire extinguisher on wheels, so that it can be hauled to any part of yard, several 3-gallon extinguishers, distributed throughout yard, water pails filled with water, and it would also be a good plan to have pails filled with water on top of lumber to be used in case of fire in vicinity where flying fire brands fall on lumber, also several casks filled with water. Salt or calcium chloride could be placed in the water in cold weather to prevent freezing. Ladders should be distributed about yard to reach tops of piles when needed.

Should have a watchman on premises at night and have his movements recorded on a time clock; also have telegraphic communication with fire department headquarters.

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**No. 49** INSTRUCTION IN FIRE PREVENTION.—The fire waste throughout the country is attracting more attention than ever before and several States have shown a disposition to recognize the principle that the enormous destruction of property annually is an economic waste of the

country's resources, with the result that they have expressed a decided sentiment in favor of establishing special legislation, which will tend toward greater conservation, and are abandoning their former attitude of assuming that as long as property is insured there is no loss.

In the face of facts the attitude mentioned is absolutely erroneous, and it can be corrected by the education of the public, starting with the children, whose receptive minds are open to instruction in the saving of life, which is of the most importance, and the preservation of property. Let people know the full danger of fire chargeable annually to carelessness through the thoughtless handling of matches, the storage and handling of gasoline, oil, fire works and explosives. Show the menace of permitting trash piles to accumulate, or in the unkempt cellar, inflammable materials to be stored in closets, attics or elsewhere.

By teaching the children, some of whom will in a few years administer the laws, a long stride toward fire prevention will be taken, and the children, while being taught, will interest parents, who will, as never before, recognize the importance of the question, and, rather than plead ignorance on such an important and self-interesting subject, will lend their aid in the campaign for fire prevention.

One individual or a set of individuals can do only little, but if the sentiment for the saving of life and property is spread (and it can be through education) the interest must increase, and a vast army, fighting against fire waste, will soon bring results. Fire prevention means the saving of life and property, and it should appeal to every one, else something is lacking. What is it?

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**No. 50** EFFICIENCY IN FIRE PROTECTION.—Fire prevention and fire protection are the great problems in the movement for the conservation of property. The United States Forest Service has made special investigations as to the best methods of protecting the national reserves from fire loss. Many of the adopted methods are applicable to fire protection anywhere, and a reading of bulletins will be of value.

The proper protection of such large tracts depends almost entirely on thorough organization. Large private companies usually have the fire protection work well organized, but too often the protection of public property, depending on civil officers, is carried on in inefficient and expensive ways.

Efficient protection by such public officers depends on three or four main points:

Early inspection of fire areas.

Knowledge of natural conditions.

Knowledge of location of such areas.

Discussion on the need of fire protection, thus creating a public sentiment and securing ready cooperation.

By inspecting early in the season, before the dry weather, all regions in which fires are likely to occur, the warden can plan his campaign for prevention, protection and fire-fighting.

The manner and rapidity of burning and the intensity of the fire depend upon the following conditions:

Character and quantity of inflammable materials.

Lay of the land.

Character of the soil.

Condition of the atmosphere.

An accumulation of litter from large-leaved, large-crowned trees offers good conditions for a severe surface burn, especially if many dead limbs and trees are on the ground. A layer of resinous, softwood needles burns more rapidly, and makes a hotter fire, than does a layer of hardwood leaves. A fire runs up hill very rapidly because of the heated air currents, which draw the flames upward. Abrupt walls, narrow ridges, ledges, etc., tend to check flames. On sand and limestone soils, which warm up and dry out readily, fires usually are severe. Night is the best time in which to fight fire, as there is little or no wind, and the air is damp.

A fire warden should apply knowledge of that kind to his districts in organizing his work of clearing away litter, regulating patrol, or fighting fires.

Posters of fire warnings against care-

lessness often give instructions how to construct and extinguish campfires. In places where foreigners are employed the notices are printed in Italian, French, etc.

Army signal codes and flags, fire or smoke signals, fire bells and whistles, are used in reporting fires, and, of course, the telephone, when available. Lookout stations are great aids. For a small tract a station may be arranged on the roof of a building or near the top of a tall tree.

In large tracts roads and trails have attention as fire lines and as means of patrol. In small wood-lots old lumber roads may be kept open.

In a case of fire the warden should know at once, by the location, what the conditions of the area are. Such conditions and the weather conditions will determine an adequate force and equipment.

Small fires may be beaten out. A gunny sack, especially if it can be wet from time to time, is one of the best things for beating. A blanket, coat, or green branch is used often. For running fires sand is one of the best extinguishers. If water be brought from a distance, it may be used first to deaden the fire, after which one of the other methods of extinguishing will be practical.

The most frequent cause of fire in each area should be determined and where possible should be eliminated. Adequate laws, enforced properly, are necessary, but more necessary is a feeling of personal responsibility by each individual to do everything possible to prevent fires as well as to fight fires.

## PRIZES FOR FEBRUARY ARTICLES.

*First Prize. No. 46. L. A. Phelps, Superintendent of Factory Inspection, Avery Company, Peoria, Ill.*

*Second Prize. No. 43. Ivan C. H. Young, Automatic Sprinkler Engineer, Canadian General Fire Extinguisher Company, Ltd., Toronto, Ont., Canada.*

*Other meritorious articles were contributed by Mrs. A. May Holaday, Chico, Cal.; William C. Kerber, Inspector, Fidelity & Deposit Company of Maryland, Boston, Mass., and George A. Leuser, Printing Pressman, Norwood, Ohio.*

## COMMENTS BY MEMBERS OF THE COMMITTEE.

Fire prevention and fire protection in the factory, as presented by No. 46, are very ably covered, showing a knowledge of the subject that would speak of experience of the writer with this class of hazard. The large valuation involved in factory plants as a unit risk, and the fact that the combustible contents of a large percentage of such plants will always be with us, makes this subject in hand of vast importance. The suggestions brought forward by the writer are of the very best. I vote for No. 46.

Perhaps it is not a nice thing to do, but the attention of the author of No. 42 is called to the fact that the method suggested, i. e., interior plastering of flues (parquetting) is forbidden by practically all building ordinances. The only generally accepted chimney lining is one of terra cotta.

It is sometimes practicable to drop such a terra cotta lining into an old chimney, but the problem of plaster lining an 8-in. x 12-in. flue, say 50 feet tall, is considerable.

No. 46 for first prize, because of completeness. It sets up a comprehensive ideal, probably unattainable as to complete compliance in practice, but so excellent that any attempt to realize it even in part should have beneficial results.

I cast my vote for No. 46 as giving a very complete review of the means to be adopted in connection with factory fires. The part relating to establishing, equipping and controlling a fire-fighting force in the factory is, in my opinion, extremely

clear and complete. Even with the best of housekeeping, fires may be expected to occur, and this article is particularly timely in emphasizing the need for a properly disciplined fire-fighting force.

❦ ❦ ❦

I select No. 43. The writer strikes at the heart of fire prevention. To bring home to the wives and children of our homes this all-important lesson should be our initial aim.

❦ ❦ ❦

No. 46 has covered a good subject. The third paragraph of his article is something that should be carried out in every plant or factory. It is the keynote to fire prevention. His description for the care of sprinkler systems is good, also his talk on fire equipment and drilling of private fire brigades.

❦ ❦ ❦

Caution produces an efficiency that acts as a safeguard for life and property. The writer of Article No. 46, to whom I give my vote this month, substantiates this principle by the suggestions in his various paragraphs.

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*To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The work and efficiency of public fire departments, fire prevention bureaus, and private fire brigades present many important subjects for discussion.*

*Short, practical articles are wanted on every subject that will prove of value to firemen (public or private), and to inspectors and others interested in The Fight Against Fire. Articles may cover methods and practices relating to fire fighting and fire prevention by public departments, faults of construction that create fire perils, the fire hazards of processes that endanger life and property, how firemen and public inspectors may qualify themselves for advancement, the character and use of apparatus and other equipment, private fire brigade organization and drill, employes' exit drills, regulations and requirements of all kinds, etc.*

*In passing upon the articles submitted, the Committee to Award Prizes will be influenced, in each case, by the evidence an article gives of its writer's knowledge of and interest in fire prevention or fire extinguishment, in general, and by the practicability and adaptability of the writer's suggestions and ideas.*

*Articles will be received from any person competent to discuss the questions of fire prevention and fire extinguishment. Contributions are especially invited from members of city fire departments and fire prevention bureaus, members of well established private fire brigades, insurance engineers and others. No consideration of any kind is required for the privilege of competing.*

*Drawings, sketches and photographs may be submitted whenever they will aid or supplement the texts of articles.*

*Blanks upon which to submit articles for this department of SAFETY ENGINEERING will be furnished on application. But any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

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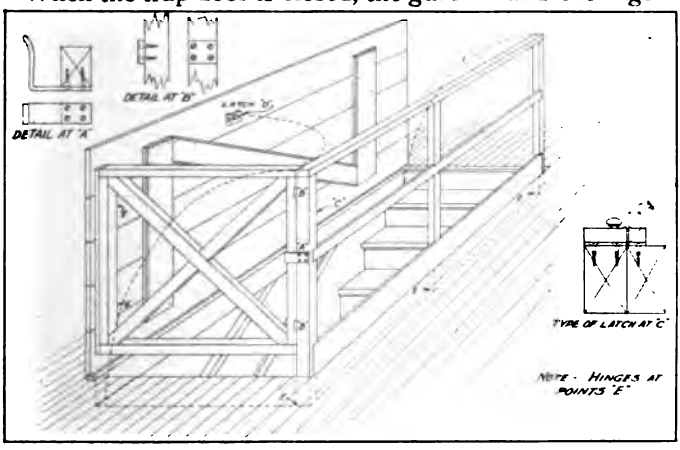
## GUARD FOR TRAP DOOR.

The accompanying sketch shows an efficient method of guarding a trap door floor opening, as suggested by William C. Kerber, inspector for the Fidelity & Deposit Company of Maryland.

When the trap door is closed, the guard is folded under, the gate being held by latch "D" and the side rail supported by the top tread. After opening, the side rail is first placed upright and the gate is then thrown into position. The latch "C," on the far side of the gate post, engages with the socket of railing post and the lugs "B" overcome side thrusts, making the whole a rigid frame. It is claimed that the plan of guarding trap door floor openings, as shown at the top of page 54 of "Universal Safety Standards" is all right where the doors run parallel with the stair treads, but that where the door, when opened, stands perpendicular with stair treads the guarding as here proposed affords greater safety.



SHARING PROFITS FROM SAFETY.—In February the San Diego Electric Railway Company accounted with its employes respecting the accident fund begun last April

At the general office of the street railway company the appended letter from Vice President and Managing Director William Clayton was presented to the 304 car men with a check made out to the order of each individual for his share of the savings, $15,468.69, representing the amount saved in the nine months since April 1, 1914. The checks averaged more than $50 per man, the division being made on the basis of hours of actual service, some receiving less and others more. Mr. Clavton's letter:

San Diego Electric Railway Company—Point Loma Railroad Company.

San Diego, Cal., February 20, 1915.

To Motormen and Conductors:

Enclosed herewith is a check representing your share of the savings effected by our "Safety First" plans in San Diego. After a very careful investigation of the cost of accidents, extending over a period of three years, the San Diego Electric Railway Company agreed with its motormen and conductors that it would set aside the average cost of car accidents (exclusive of law department expenses, claim department expenses, etc.), during the previous three years in proportion to the gross receipts of the company.

We started on April 1, 1914, with an absolutely clean sheet; that is to say, none of the accidents that had taken place prior to that date were charged against the fund. There were, of course, considerable sums of money paid out between April 1 and December 31, 1914, for accidents which had occurred previous to April 1, 1914. These payments have been met by the Electric Railway Company.

The whole object of this "Safety First" fund has been to encourage the motormen and conductors to use the greatest possible vigilance in avoiding accidents to the traveling public, whether passengers on the street cars, in automobiles, or pedestrians on the streets. We believe that a special reward for vigilance on the part of the motormen and conductors in avoiding accidents is beneficial to the public and the railway company. The result of the first nine months confirms our judgment that the plan is good, and we are all satisfied.

The total amount of money saved out of the accident fund for nine months was $15,468.69. This check is your share of it. This division has been made on the basis of the number of hours each motorman or conductor has worked in the period of nine months, which is the fairest way, in our opinion, any division could be made. We hope the results of this plan are perfectly satisfactory to our street car employes, that it will encourage them to still greater effort and greater vigilance in avoiding accidents. It would be a great pleasure to us if we could say at end of the year that we had had no accidents whatever and that we would be able to turn over to our men three per cent of the gross receipts, amounting to $30,000, $40,000, or any other proportionate sum, as some reward for the excellence of their judgment or vigilance in street car operation. The best thing I can say in addressing this letter to you is that the more you can make out of this fund, the better we will be satisfied.

Yours very truly,

W. CLAYTON,
Vice President and Managing Director.

The company's efforts do not stop with the strict training of its car men, the purchase and maintenance of the highest standard of equipment, but include constant appeals to the public for its co-operation in preventing accidents. Earnest endeavors are made to reach the school children through their principals and teachers in order that they may fully realize the possible ghastly results of a careless or thoughtless moment on the streets. Mothers are asked to use every precaution that their children may have a wholesome fear of that most dangerous of pastimes, playing on streets, particularly those occupied by street car tracks.

DES MOINES RESULTS.—Seventy-five fewer accidents occurred on the Des Moines city railway during 1914 than in the preceding year, according to a report by Emil Schmidt, president. He attributes this reduction to the fact that the company adopted and faithfully tried in every respect to adhere to the "Safety First" idea.

The report shows that there were 1,248 accidents last year, which cost the company $26,467.54. In 1913 there were 1,323 mishaps, which cost $13,725.93. The saving was more than $4,000.

More than a year ago the street railway company began a campaign of education to lessen the number of accidents. Placards bearing warnings to passengers, fathers, mothers and children were placed in the cars and the employes were constantly reminded of the necessity of strictly observing all rules with reference

to the operation of cars. A large portion of the credit for the good record made by the company is due the employes, President Schmidt says.

OMAHA FIGURES.—A reduction of of 126 in the number of employes of the Omaha railway injured in service in the six months ended February 28 as compared with the corresponding period of the preceding year was brought about by the "Safety First" organization of the company. The total reduction in the number of employes injured during the year was 336. The number of employes killed during the six-month period was 4, as compared with 8 the year before.

No passengers were killed. The number of trespassers killed was 7, an increase of one. The number of employes injured during the six-month period was 494, as compared with 620 in the corresponding period the year before. Others injured included 54 passengers, 28 trespassers and 28 civilians, a total of 604 persons and a decrease of 136.

ACTIVE SAFETY CAMPAIGN.—The Southern New England Telephone Company has started on an active campaign for "Safety First," and its monthly publication, the *Bulletin,* devotes several pages to an outline of the campaign. Signs have been posted throughout the exchanges of the company, foremen and other supervisors have been directed to caution their men and to take all possible care that none are hurt. Aside from the humanitarian side of the problem, the campaign has an important economic aspect, for the necessity of keeping trained men in the pink of condition is realized more each day by executives who are trying to keep down expenses. It is business to spend $10 to keep your trained man from hurting himself, rather than spend $20 to train a man for his work.

FALLING POLES.—The records of the Southern New England Telephone Company show that many of the most serious accidents and several fatal ones have been caused by poles falling while the men were working upon them. Investigation of these accidents usually discloses the fact that the cause of the pole falling was due primarily to decay at the ground line, and also that the pole was not properly inspected and guyed or otherwise secured by the lineman before climbing.

Very often a pole may be sound enough to support a man climbing or working on the pole when no side strain is put upon it, but as soon as any appreciable side strain is brought to bear upon the pole and it is not properly guyed in the opposite direction, it will break off and fall.

Sometimes the poles are pulled over by the men themselves, as in cases where it becomes necessary to dead end the wire on a pole at the end of line or some time where long loops are being placed at right angles to the lead and a considerable strain is necessary to pull up and fasten the loop where it belongs. Also, poles frequently appear to have been holding a heavy line of wires, but as soon as the wires have been removed the poles fall. This usually occurs in connection with the pole replacements. Care should always be taken to see that old poles are properly lashed to the new pole or guyed or braced in some other manner before removing the wires.

Accidents in connection with falling poles have sometimes been rendered more serious by the fact that the men were secured to the pole by means of body belts or "safeties." From this it might be inferred that the "safety" was a dangerous tool to use, but every lineman knows that when the "safety" is used properly and is carefully watched as to wear and other defects, it allows the lineman not only freedom of movement, but also acts as a life saver in case of contact with live wires by preventing the user from falling to the ground.

Where men have been hurt by the use of "safety" belts in connection with falling poles, the fault does not ordinarily lie with the belt, but usually with the man himself or with the foreman in charge of the work for not having properly inspected the pole before working upon it, or for not having properly guyed the pole before putting a considerable amount of unbalanced strain upon it.

PREVENTABLE ACCIDENTS—The attention of the employes of the United Gas Improvement Company of Philadelphia has been directed to a record of accidents that could have been prevented and to the suggestions for avoidance.

While working on electric switch, an employe's eyes were injured by flash. Suggestion: Goggles.

Employe cut a finger slightly and neglected the wound. Infection followed, causing two weeks' disability.

Suggestion: Prompt first aid treatment.

Horse was injured by stepping into open valve box. Lid had been off for some time.

Suggestion: Inspection; replacement.

Blacksmith was working over anvil and a piece of steel entered an eye. Was not wearing goggles provided for him.

Suggestion: Obvious.

Globe of an arc lamp on maintenance fell and burned merchandise.

Suggestion: Wire net around globe.

Runway from platform was not in place, and an employe deliberately pushed a loaded truck from the platform to the floor, which was sixteen inches lower. The man was struck in the abdomen by a truck handle.

Suggestion: "Taking care, not chances, means safety."

Loose brick from wall of generator house fell and struck a man's head.

Suggestion: Inspection; repair.

An employe, using drill, blew away from the hole an accumulation of steel cuttings, one of which entered an eye.

Suggestion: Goggles.

Employes in a store left a trap door open and the proprietor fell into opening.

Suggestion: See that trap doors are kept closed or guarded.

A fitter was working near escaping gas while a helper held a candle. The gas ignited and the fitter was burned.

Suggestion: Obedience to rules.

Door fastened ajar. Late in afternoon, employe, due to poor light, collided with it. Suggestion: Lights.

Employe piled bricks insecurely to height of six feet. Pile fell and injured his foot. Suggestion: Care.

Defective wrench slipped, causing employe to fall and puncture foot on nail. Suggestion: Inspection. Turn in defective tools.

Fitter working on concealed piping left opening in floor and went to another part of house. Woman fell into opening. Suggestion: Guard. Warn consumer of condition.

Piece of heavy timber, supporting a chain hoist, fell and chain struck operator. Suggestion: Fasten timber securely. This calls to mind a similar case in which a section of "I" beam, used for the same purpose fell and injured an employe.

ROTTEN POLE.—A pole was rotten at its base and was held up by a single wire. The defect had not been discovered. When two men were working on the pole the wire was loosened, and the pole fell and injured the man who was among the cross arms.

## SCRANTON POLICE.

In Scranton, Pa., policemen and firemen are being instructed in the rudimentary knowledge implied by "Safety First" and First Aid, under the direction of the Director of Public Safety. "No movement in recent years," says the Scranton *Times*, "has gained such hearty endorsement and encouragement as 'Safety First.'" The adoption of safety principles by municipalities of the size and importance of Scranton is logical."

## DUMMY TRAFFIC OFFICER.

"Unable to afford the services of a traffic officer," says the Detroit *Tribune*, "the little town of Charlotte, Mich., has solved the problem of traffic regulation inexpensively. The solution was the installation on main corners of dummy traffic officers with four extended arms, each carrying instructions to drivers of vehicles."

## PULL OUT NAILS.

In Massachusetts last year 3,462 persons were injured by nails. Don't leave nails exposed in boards, boxes, barrels, etc. Frequently bloodpoisoning and lockjaw are caused by nail injuries.

# SAFETY WORK BY RAILROADS

BALTIMORE AND OHIO.—In a review of the "Safety First" campaign conducted by the Baltimore and Ohio System during 1914, a report issued by the General Safety Committee shows that 91 per cent of all items recommended to improve safety conditions was disposed of by the company. Recommendations totaling 9,256 items were made by 698 employes who are members of safety committees on 23 divisions throughout the territory served by the railroad. These men kept a constant vigilance in the interest of the traveling public, their fellow employes and shipments entrusted to their care; and only 806 of the items reported remain under consideration. The Ohio River committee, whose headquarters are at Parkersburg, W. Va., disposed of 91 out of every 100 of the 892 recommendations made. The Ohio committee, with offices at Chillicothe, Ohio, led in percentage of cases disposed of with an average of 97 per cent on a total of 448 items recommended. The Chicago Terminal division was second with 96 per cent of the items corrected. Showing the cooperation between the employes and management of the Baltimore & Ohio, the first American railroad to establish a "Safety First" department upon ideas originated by the Chicago & Northwestern railroad, the report shows that on no division of the system did the percentage of recommendations adopted during the year fall below 80. On several of the divisions fewer than 10 cases remain to be disposed of, which means that the company recognizes the qualifications of its men to pass upon conditions surrounding their personal safety as well as the safety of passengers.

DISTINGUISHED TRESPASSERS.—That the New York Central Railroad is in earnest in its "Safety First" campaign shows up in many ways, the Peekskill (N. Y.) *News* declares. The following recent newspaper item is one sign of it:

> Jurymen and those connected with county work in White Plains and who live in Peekskill and Ossining and in other northern Westchester county villages, were a 'sore' lot this morning when railroad detectives prohibited them from walking up the tracks to the Main street crossing at Tarrytown to take the trolley to White Plains. It was only last week that there was a narrow escape when an express dashed through while the passengers were walking upon the track after alighting from the 8:32 express.

Activity on the part of many railroads to lessen the number of fatal accidents on their lines by more careful policing in the sections where trespass is prevalent is bearing fruit. Energetic efforts to combat the evil have been made in New York State by the New York Central Lines, whose safety agent in 1913 visited justices of the peace and police court magistrates armed with statistics of deaths or injuries of trespassers. The majority, appalled by the slaughter, agreed to punish offenders brought before them.

Government records show that more than 5,000 persons are killed in this country each year while trespassing on railroad tracks. In Canada, where stealing rides is a crime punishable by a fine of $50 or two months in jail, there are very few tramps. This is worthy of being borne in mind by those whose sentiments lead them always to look upon the freight rider as a poor fellow searching for a job.

MISSOURI COMMISSION.—Frank A. Wightman, member of the Missouri Public Service Commission, whose special duty is to inspect the physical condition of all railroads operating in the State, recently completed his annual report. During 1914 he inspected 8,294 miles of main line track. The remaining 160 miles of railroad were not inspected because they comprise only switching lines or were not in active operation. The purpose of these inspections is to determine whether the general conditions on steam and electric lines provide safe and adequate means of transportation.

In addition to inspecting the road and track, special attention was given to depot accommodations. In all, 1,096 depots were inspected. Ninety per

cent of the railroad stations in Missouri are of frame construction, and most of them were built in the early days of railroading in the State, when they were ample for the business.

On the subject of depot construction, Commissioner Wightman says: "More attention is being given to permanency in depot building and a number throughout the State are being built by different roads, using brick, concrete and stucco; many more appear advisable as well as desirable and are contemplated on the part of the railroads as funds become available."

Commissioner Wightman devotes a chapter to "Safety First." He says:

"The occasional crushing and burning of wooden coaches with its contingent horror and large list of fatalities has created a general belief that the substitution of steel for wooden cars would be a solution of the safety problem. The manufacture of better rails, the proper maintenance of track and equipment, the limitation of the maximum allowable speed, the installation of automatic safety appliances and signalling systems, the increase in efficient supervision, are all of equal importance and should receive grave consideration in determining which should have preference in considering expenditure for the promotion of safety."

RAILROAD LABORATORIES.—An interesting but inconspicuous adjunct of some railroads today is the railroad laboratory, notes the Providence (R. I.) *News-Democrat*. Generally tucked away amid grimy shop buildings without any external evidence of its character or purpose, the railroad laboratory performs a most useful function, ever growing more important as the railroad practices economy and at the same time seeks to give safe and proper service.

There is something very practical about the railroad laboratory and much that distinguishes it from the general run of laboratories. Its motto is both safety and efficiency. It has the twofold object of safeguarding human life and conserving the railroad's resources.

While not all railroads have as yet adopted the practice of maintaining their own laboratories, the New Haven for some years has possessed such an institution, completely equipped for making chemical and physical tests and manned by a staff of expert chemists and phyicists, graduates of the leading technical schools of the country. This laboratory is located near its shops at New Haven.

An idea of the scope of the New Haven's laboratory may be gained from the fact that the milk and ice cream served in the dining cars are tested here, as well as the steel from which axles, wheels and cars are made, the air brake, so vital to safety, the coal consumed in the locomotives, and the creosoted ties under the rails, to mention only a few of the things tested.

About 10,000 tests were made in a year of this laboratory's operations. They ran all the way from pencils to locomotive piston rods, from milk to paint. Being both a physical and a chemical laboratory an iron bar can be tested in it for its tensil power and drinking water for its impurities. The safety principal may be involved in both.

CASUALTIES UNDER "FULL CREW" LAW.—In an argument for the repeal of the "full crew" law of Pennsylvania, and replying to an appeal to the legislature by the executive committee of the trainmen's organization, the executive committee of presidents of twenty-one associated railroads in Pennsylvania and New Jersey said that the actual result of railroad operation under the law had been a large increase in the casualty list, particularly as to the class of accidents that the trainman had asserted that the law would prevent—injury to passengers getting on and off trains. Fourteen of the twenty-one railroads, operating in Pennsylvania and New Jersey, have the following figures of accidents:

Before the enactment of the law. First six months of 1911: Trainmen killed, 45; injured, 2,307. Under the law. First six months of 1914: Trainmen killed, 30; injured, 3,008.

Before the enactment of the law. First six months of 1913: Passengers killed, 5; injured, 293. Under the law. First six months of 1914: Passengers killed, 3; injured, 350.

Replying to the trainmen's assertion that the railroads would underman trains, even at the risk of accidents, the committee said that, if the railroad managers were devoid of all regard for human life and safety, the cold dictates of business sense would cause them to man trains so as to avoid accidents, which are costly and out of all proportion to $2.75 as the daily wage for one trainman.

Referring to the "dead past," the committee said the railroads had admitted frankly that in the past they had been too slow in introducing safety devices, partly owing to the cost involved, but largely because of a stupid and stubborn attitude of mind, once too prevalent among railroad managers. In many cases the railroads did what was obviously right, and as results demonstrated, only under the compulsion of public opinion and the enforcement of laws. The committee said that railroad managers, as a body, had reached a more enlightened state of mind.

SAFETY LESSON.—"Safety first" at railroad crossings was the principal note sounded by the students of the department of engineering in their exhibit at the University of Wisconsin exposition, March 19 and 20. They prepared a large model consisting of fourteen feet of model rail designed to represent a steam line. But this model was operated by electricity carried on a third rail. The model took up the problem of safe grade crossings and showed both an improved and an unimproved crossing.

"I was glad to learn that space would be given in the big exposition for students to learn the problems of engineering," said C. M. Larson, chief engineer for the Wisconsin railroad commission. "In my opinion such an exhibit is valuable not only in attracting the interest of those who may not have a clear idea of what line of work they desire to enter, but in assisting the student to correlate the practical with the theoretical and in demonstrating how these theories are worked out in actual railroad practice."

There was an exhibit showing modern practice with respect to railroad construction and operation and with special reference to types of construction, block signals, highway crossing protection and elimination and other modern improvements. The train had automatic couplers and electric headlight and it raised and lowered an electric block system as it passed. Bridges over stream, tunnel and other characteristic features of the railroad were used to show what the students in the railway engineering department at the University of Wisconsin study.

A RIGHTEOUS STATUTE.—The Galveston (Tex.) *Tribune* rejoices that one State at least has had the boldness to go on record as against permitting the railroad trespassing suicide from making profit of his foolhardiness. A statute of the State of Missouri provides: "If any person not connected with or employed upon the railroad shall walk upon the track or tracks thereof, except where the same shall be laid across or along a publicly traveled road or street or at any crossing, as hereinbefore provided, and shall receive harm on account thereof, such person shall be deemed to have committed a trespass in so walking on said track in any action brought by him on account of such harm against the corporation owning the railroad, but not otherwise." While this law does not stop trespassing, it places the blame for what harm may come just where it belongs and that is at least an attempt at justice toward the railroad company.

SAFETY RULES OBEYED.—Of 3,861,962 efficiency tests and observations made on the Pennsylvania Railroad last year, more than 99.9 per cent showed obedience to the train safety rules. In other words, the safety regulations were followed to the letter 1,494 times in every 1,495 cases observed. Tests to the number of 24,798 were made of the observance of stop signals, and in only 34 cases did the employes fail to live up to the strict letter of the rules.

# FACTORIES, MILLS AND WORKSHOPS

ECONOMIC LOSS OF $600,000,000.—The actual number of workmen killed and injured annually in the United States is not known definitely, due to the lack of co-ordination in statistical departments in the States. The best authorities, on data available, have estimated fatalities to the number of 40,000 to 45,000 annually, and non-fatal accidents as producing an annual loss of 200,000,000 working days. Reviewing the figures and putting them on a cold dollar-and-cent basis, estimating the value to society of each man killed at $5,000, and $2 as an average daily wage of the non-fatally injured, the economic annual loss sustained to the nation amounts to approximately $600,000,000, an amount which, in some way or other, must be charged to the production cost in the various industries where the accidents occurred.

ACCIDENT PREVENTION IS GOOD BUSINESS.—The real meat of the subject of accident prevention is to make the employer of labor see that accident prevention is good business; that it promotes efficiency in his plant; and it is up to engineers and master mechanics to convince him. It is up to us to study the most recent developments in accident prevention and keep abreast of the times, an engineer said. We must dispense with all of our preconceived ideas as to the safety of a given machine or any piece of equipment; we must, in designing new machinery, pay as much attention to the safety features as we have in the past devoted to efficiency; we must make sure that the machine we are designing will not alone turn out the product for which it was intended; we must equally be certain that the men who operate it can do so without danger of being maimed or killed.

ANALYSIS OF ACCIDENT RECORDS.—A careful analysis of hundreds of thousands of industrial accidents in this and other countries discloses that approximately 20 per cent of such accidents is due to defective and unguarded machinery and appliances; 30 per cent to inherent carelessness, recklessness and disobedience of rules and regulations on the part of the employes; 40 per cent to inherent hazards in the various industries. This 40 per cent will continue to occur as long as the present methods of conducting industries are in vogue. Immediately, however, that safer methods of operation are introduced in any industry, thereby reducing the accident frequency in that industry, the total percentage under that heading will be proportionately reduced. The remaining 10 per cent of all industrial accidents, a safety engineer said, we have never been able to segregate under any particular heading. They are due to all causes combined. No particular party can be held responsible.

STOP YOUR MACHINE!—In one State in 18 months 500 men and women were injured while cleaning their machines in motion. More than one-half lost one or more fingers; some lost hands; one lost his arm; one was killed. Stop your machine before cleaning it!

SIMPLE PROBLEM.—The elimination of defective and unguarded machinery and appliances is largely an engineering problem, and in many instances ar exceedingly simple one, an engineer said. There is absolutely no reason or excuse why any man should be killed on accoun' of a protruding set screw, a set of unguarded gears, a rapidly moving belt, not encased; a defective rope or chain, that should have been renewed; the collapse of a structure which has been overloaded or imperfectly constructed; by falling down a stairway, on account of the treads being in bad condition, or on account of steepness, or because a hand rail had not been provided, or because it was insufficiently lighted.

MACHINES AS SCHOOLMASTERS.—Many manufacturers and employers generally in this country have never heard of the subject of accident prevention, or, if heard of it, have paid little or no attention to it. The duty devolves upon the engineering profession of the United States to bring it forcibly and continually to their attention, espe-

cially by recognizing the safety principles, when designing machines, making, as it were, every machine, manufactured and properly guarded, a school master; and in their capacity, as managers, plant engineers and superintendents to do their utmost in developing interest in safety among the working population.

EMPLOYER'S CHIEF DUTY.—The duty of an employer is not fulfilled by merely attaching a guard to a machine, by putting a warning sign in its place, or by posting a set of rules, said the N. F. A. *Safety Bulletin,* for it must be clear to all students of the safety problem that only a very small proportion of hazards can be controlled thereby, and that the vast preponderance of injuries can only be reduced by the personal care of employes themselves. The employer's chief duty is to interest his employes in the safety movement and to make them fully realize that.

TEAM WORK.—The work of the doctor and of the safety inspector must be teamwork, said G. L. Avery. It cannot be separated, and only as these two work intelligently and harmoniously will safety work in its broadest and highest sense be carried beyond the mechanical, beyond the mental or educational, even beyond the intellectual and up to that plane which, in the individual development, is called the spiritual.

# MINERS AND MINING INDUSTRIES

MOTION PICTURES FOR SAFETY.—The latest use of moving pictures adopted by any of the government branches according to the Washington (D. C.) *Post,* has been begun by the United States Bureau of Mines, which is spreading "Safety First" information among mine workers by means of the films and lantern slides. Practically all of the departments have introduced motion pictures to show the government's varied activities to the general public. The films, however, have been planned not for general entertainment, but purely for instruction to miners, who are more interested in pictures which show the meaning of the first aid and safety-first work than they are in reading government publications about the same subjects.

KILLED IN COAL MINES.—The 1914 casualty list for 750,000 men employed in American coal mines shows that 2,451 men were killed, a decrease of 334, if compared with the 1913 list. The number of miners killed for every one million tons of coal mined in 1914 was 4.81; 1913, 4.89. With the exception of 1912, the 1914 rate was the lowest recorded for the United States. The amount of coal produced for each miner killed in 1914 was 208,078 tons. The explosions from coal dust in 1914 decreased 96 per cent compared with 1913.

The reduction of the record is credited to closer and more careful inspection by State inspectors; better enforcement of laws and regulations by the operators; better realization of the dangers attendant upon the miner and his efforts to reduce accidents, due to educational campaigns; extended use of safety lamps in doubtful mines; use of permissible explosives; wetting of dusty mines to prevent explosions of coal dust; first-aid and rescue training; industrial accident compensation laws; cooperation on the part of all concerned.

SAFETY DEVICE FOR MINERS.—The dangers of mining are lessened by a safety device, invented by Letson Balliet, general manager of the Buckeye Belmont Mines, Tonopah, Nev. It consists of an extra sheave wheel and a second cable, to which is suspended a counterweight, following a guide in another compartment of the shaft. It serves to balance the weight of the cage.

The farther the cage descends into a deep shaft, the greater is its weight, combined with that of the cable. To equalize the weight of the cable a chain is attached to the counterweight and is suspended so that, as the cage descends deeper into the shaft, the ascending counterweight takes up more and more of the chain, preserving an approximate balance. It is accomplished by hanging one end of the counterweight tail line to the timbers

about half way up the shaft, so that when the cage is at the top the weight of the chain is on the timbers while the counterweight rests on the bottom. When the cage descends, the counterweight rises and takes up the chain a little at a time. The system can be arranged so that additional chains can be set in the shaft at intervals.

With this arrangement when men are working in the lower part of the shaft, the hoist can be operating from higher levels. By an adjustment of the counterweight tail line, it would be impossible for a cage to drop upon the men, even if the cable of the hoist should break. With the device in its normal position the cage with its load of miners would not drop to the bottom, but would come gradually to rest at the bottom of the shaft, because of the balance maintained.

Besides the counterweight tail line, a similar chain is suspended in such a way that it can be tripped in case of accident, either by hand or automatically, in case the engineer overwinds.

To demonstrate his confidence in the system, as installed at the mines, Mr. Balliet has taken a place in a cage, detached the hoisting cable, blocked all safety appliances and allowed the cage to drop to the bottom of the 1,200-foot shaft.

As the device reduces power expense for hoisting, it pays for its installation in a short time.

## BOOKS.

GAS POISONING IN MINING AND OTHER INDUSTRIES. By John Glaister, M. D. (Glas.), D. P. H. (Camb.), F. R. S. E., etc., and David Dale Logan, M. D. (Glas.), D. P. H. William Wood & Company, New York, publishers. 471 pages. Price $3.50, postpaid.

The authors have brought within reasonable limits all that is known at present on the subjects of poisoning by carbon monoxide and other gases that arise chiefly in mining and other industrial pursuits. The subject has been the theme of papers, monographs and theses in various countries. The authors have labored diligently and with success to bring together in a single book the results of the studies of many investigators. The volume is illustrated interestingly. The bibliography compiled by the authors is probably the most complete that has been prepared.

REPORT ON FIRE IN THE EDISON PHONOGRAPH WORKS, DECEMBER 9, 1914. Prepared jointly by the National Fire Protection Association and the National Board of Fire Underwriters. Price 25 cents.

The chairman of the executive committee of the National Fire Protection Association, Mr. F. J. T. Stewart, says that the purpose of the detailed investigtion and preparation of the report has been solely to profit by the unusual experiences gained in the Edison fire and to utilize them to the best possible advantage in the future when studying methods for safeguarding life and property against fire. The consulting engineer of the National Board, Professor Ira H. Woolson, the superintendent of the Engineering Department of the Office of Schedule Rating for New Jersey, Mr. Charles H. Fischer, and the engineer of the New York Board of Fire Underwriters, Mr. G. Y. Lancaster, Jr., have contributed to the preparation of the report. The illustrations comprise twenty-nine photographs, drawings and plans. The square shape and other variations from present day practices in the design and construction of the concrete columns in the Edison buildings is held accountable for a part of the structural injury.

FIELD PRACTICE. National Fire Protection Associaiton, Boston, publisher. 200 pages. Price, $1.50.

This is an inspection manual for property owners, fire departments and inspection offices, covering the common fire hazards and their safeguarding and fire protection and unkeep. It has been published to meet an increasing demand for an official publication. The recommendations, as far as possible, are in non-technical language in order that any one responsible for the safeguarding of hazards and the maintenance of fire protection of properties may readily understand them. The publication does not conflict with the standards of the association as published and promulgated by the National Board of Fire Underwriters. The book is of pocket size and the arrangement of subjects is excellent.

# MATERIALS, APPARATUS, PROCESSES

## HELPS IN THE PROCESS OF ACCIDENT PREVENTION.

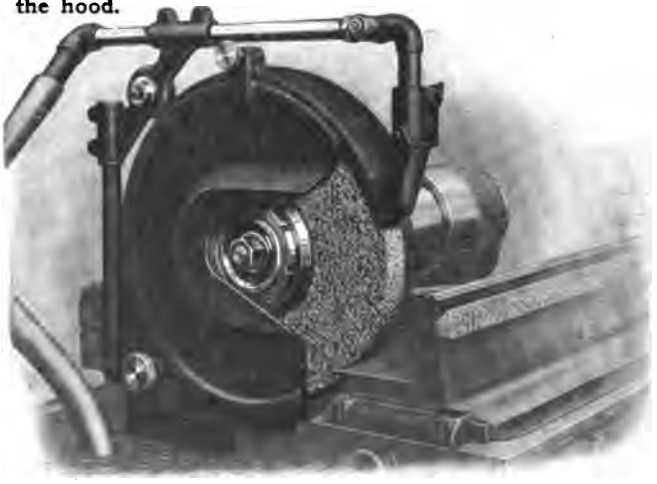
The Norton Company of Worcester, Mass., gives noteworthy attention to "Safety First." Not only does the company employ precautions and tests, that study and practical experience have proved necessary, in order that Norton grinding wheels, machinery and other products are safe and efficient, but it takes care to assure "Safety First" to the employes engaged in the manufacture of its products.

As early as March, 1909, safety work in the factory of the Norton Company was commenced. The first safety committee was organized, and on its recommendations from time to time practically all dangerous places in the plant have been guarded. How well this has been done is proved by records, which show that, on investigating the causes of all accidents reported to the Norton hospital, it is seldom that the cause of an accident can be attributed to the lack of a mechanical safeguard.

In March, 1914, a "Safety First" association was organized among the officials and workmen of the Norton Company and the Norton Grinding Company, Worcester, Mass., and a vigorous safety educational campaign started. The step was taken for the reason that careful study of accidents in the plants demonstrated that, if the accidents caused by carelessness could be eliminated, those remaining would be almost insignificant in number.

An analysis, based on a careful record for an entire year of all accidents to employes while at regular work, even those as slight as small cuts on the fingers, or grains of dust in the eyes, showed that only one employe out of five met with a slight accident in the period, and only one out of seventeen met with an accident that entailed actual loss of time; further, that the accidents caused by machinery represented only 7 per cent of the

**Breakage Test of Grinding Wheel: 16 x 2 x 1¼", Alundum 30-K Silicate; speed 6,000 surface feet. Showing desirable features and effectiveness of latest type of Norton Protection Hoods. None of the broken pieces escaped from the hood.**



**Type of Plain Cylindrical Grinding Machine Hood. Made by Norton Grinding Company, Worcester, Mass.**

total injuries; less than 12 per cent causing loss of time.

The means employed by the Norton Company to prevent accidents are too comprehensive to be given in full here, but the work done by its officials, its safety engineer, R. G. Williams, and the various organizations composed of officials and workmen, and by the Norton Department of Health and Sanitation, as well as the results obtained and means employed to secure them, are covered in a series of booklets published by this company, the latest of which, "First Aid to the Uninjured," is just off the press.

To the increasing number of employers, who, like the Norton Company, believe that "Safety First," health and sanitation, mean increased efficiency of employes, and further a good feeling between men and company, an important factor in successful operation, the books, listed below, a copy of any of which will be sent free on application to the Publicity Department of the Norton Company, Worcester, Mass., will prove of service:

Health & Sanitation, First Aid to the Uninjured, Grinding Wheel Protection Devices, Medical Supervision of Factory Employes, Safety Rules, Standard Safety Specifications, Safety as Applied to Grinding Wheels, Speed Charts, Grinding Helps, Report on Investigation of Grinding Wheel Protection Devices, Notice to Grinders, Safeguarding Grinding Wheels.

## SILENT REMINDERS IN ACCIDENT PREVENTION.

The important part played by signs in all periods of the world is well known. The blazed tree was the sign of safety to the woodsman seeking his way through the forest; the flash of light proves the sign of danger and points the way to safety to the sailor nearing shore; the footprint in the earth warns of the nearness of dangerous animals; why? Because they cause men to think, and "thinking is the prime factor of safety."

**900 of These Signs in Use on Elevated Railroads of Chicago.**

In plants where careful attention is given to "Safety First," experience has proved that the posting of attention-compelling signs at points of danger and in conspicuous places does much toward reducing accidents and increasing general efficiency.

In time one becomes used to conditions, but something new in color or design at once excites natural curiosity, causing the employe to think, and "the most important thing in accident prevention is the think habit."

**Prevents accidents, saves trouble and expense. Workmen who disobey signs like this and receive injury have only themselves to blame.**

Experience has proved that the most durable signs for accident prevention are of enameled steel. Such signs, of high quality, are produced by the Enameled Steel Sign Company, Inc., 222 North State street, Chicago. The company has devoted much time and money to the problem of producing warning signs of superior quality. The porcelain enameled iron and steel signs are made by firing and fusing vitreous enamels—not paint—into 18-gauge iron or steel under 1,800 to 2,000 degrees Fahrenheit and are guaranteed not to fade.

The company reports a growing demand for its signs, among the recent orders being one from the elevated railroads of Chicago for 900 of the No. 580 sign, 12x16 inches, blue enameled background with white letters reading "Look Where You Step."

**3,500 of these double face signs furnished Public Schools, Chicago, in 1914.**

During the last year the company made about 3500 double face flanged signs for the Chicago public schools, part of them, like the one illustrated, reading "Fire Escape," the balance "Exit."

It has been said that "the post that pays is the post that stays," and in connection with this it is of interest to note that the Enameled Steel Sign Company, Inc., uses in the manufacture of its angle iron posts for street, automobile road direction and similar signs, old railroad rails, re-rolled hot, securing the strongest posts for such service.

**A sign that warns of danger, tells its nature and what the result may be if warning is not heeded. Good example of pictorial danger sign. 1,500 made for one company.**

Danger and warning signs are specialties of the company. They can be furnished in quantities, with reading matter of any size and in colors desired. The company has in stock signs of more than 300 styles of reading matter, and it manufactures signs for any special purpose, and it can produce them in any color desired in enameled steel or iron, in embossed metal and in lithographed steel. The enameled steel signs are the lowest in cost, when length of satisfactory service is considered.

In order to meet the demand of customers, the company has issued an illustrated catalogue, which can be obtained free of charge. The book contains information of value to every employer anxious to save life and limb and the expense of damage suits. It is a handy book to own. Enameled Steel Sign Company, Inc., 222 North State street, Chicago, will furnish it promptly on request.

## SAFETY FROM FLYING METAL.

An efficient mask, the result of practical suggestions from men experienced in various hazardous occupations, and designed for the protection of men who are required to work with hot babbitt, pouring lead joints on cast iron pipe; iron and cinder men around factory cupolas and blast furnaces, and for all men engaged in occupations where the eyes are exposed to injury from flying metal, cinders or scales; has been placed on the market by the Julius King Optical Company, 10 Maiden Lane, New York.

The mask and the combination holding helmet are illustrated here. The helmet is a combination of an improved baseball mask with fencing mask head-rest.

The mask is of fine mesh gauze, easy to see through, yet affording protection. Besides the gauze, which protects head, face and ears, there is a finely ground optical glass protection for the eyes. The glass is curved so that the operator, looking through it at right angles to the surface of the lens, overcomes prismatic effect. This protection is necessary, as a splash of hot metal will often penetrate gauze, and the eyes must not be exposed to

**New Babbitting Mask.**

unnecessary risk. If broken the lens may be changed instantly for a new lens at slight expense.

A sheepskin apron covers neck and chest.

**Combination Holding Helmet for Carrying Weight of Mask without Discomfort to Wearer.**

making the new King babbetting mask practical and effective. It possesses the further advantage that it can be worn without any discomfort, a strong factor in its favor.

## PANIC FIREDOOR LATCH.

Where hinged firedoors are used, the Peters Firedoor Latch commends itself on account of its reliability.

The latch is for use on all hinged firedoors at entrances to fire towers, or any place where a hinged firedoor is needed. It is a combination of malleable and wrought iron, and is operated by a slight pressure against a cross-

bar which transmits a motion to the spindle through the door, which spindle lifts the latch bar and thereby disengages it from the keeper, allowing the door to be opened. It is positive in its action, being without springs or unnecessary attachments to get out of order.

Manufactured by James Peters & Son, 1934-38 North Front street, Philadelphia.

## LARGE INCREASE OF WIRE-GLASS PRODUCTION.

In a paper that Walter Cox, president of the Pennsylvania Wire Glass Company, read at the convention of the Glass Distributors' Association, New York, on January 28 last, the following statistics were incorporated, giving approximately the production of wire glass in the United States:

| | | |
|---|---|---|
| 1894..... | 300,000 | square feet. |
| 1895..... | 300,000 | square feet. |
| 1896..... | 200,000 | square feet. |
| 1897..... | 300,000 | square feet. |
| 1898..... | 500,000 | square feet. |
| 1899..... | 800,000 | square feet. |
| 1900..... | 800,000 | square feet. |
| 1901..... | 1,000,000 | square feet. |
| 1914..... | 15,000,000 | square feet. |

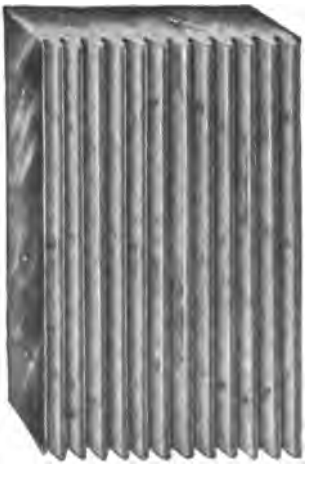
The figures represent conditions in this new industry that might seem like a baseless romance were not the facts incontrovertible; but the romance of the rise of this valuable adjunct to fire protection is based on statistics. The significant figures attracted the attention of several of the prominent dealers in building glass, and considerable comment was made.

It appears that the years 1902-1913 inclusive are omitted in the table. Within the period the great advances were made, consequent upon the disastrous conflagrations in Baltimore, Rochester, Toronto and San Francisco. In fact, 1903, the year of the Baltimore conflagration, and 1906, the year of the San Francisco earthquake and conflagration, were high-pressure years in the wireglass industry, and the years which have followed have shown a steadily increasing demand.

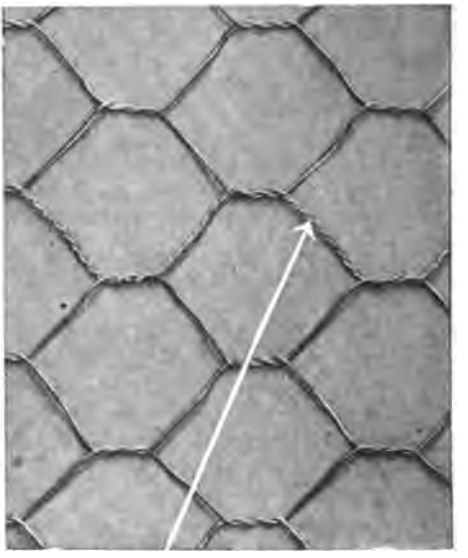
The popularity of wireglass is due to a number of causes. Undoubtedly its ability to retard fire has been an influential factor, but the great increase in production during the past decade cannot be attributed wholly to conflagrations. Quality has played an important part also. Improvements in process; the elimination of errors in teeming, pouring, rolling and annealing, have resulted in making wireglass uniform in color, strength and dependability, and added to its serviceableness in building construction generally.

Solid wireglass made by the Continuous Process is employed in buildings of every class and description for the reduction of break as well as fire hazards. The National government employs it in nearly all its buildings, including post offices, arsenals, warehouses, factories, power plants, lighthouses, warships, etc. The great railroads install it in terminals, power houses, car shops, round houses, locomotives and steamboats. The industrials, large and small, utilize it in vast quantities on the "Safety First" principle.

It seems, therefore, that there are sound economic reasons behind the increase in the production of wireglass, and the inference to be drawn is that the improvements in process of manufacture and the resultant strength and sightliness have made the use of it economical in fields in which old-process wireglass would have been inadmissible.



**"Aqueduct" Wireglass.**



**Wireglass showing twisted cabled strand. Affords even effective distribution of light and large immunity from the hazards of breakage.**

## SAFE AND DURABLE FLOORING.

A composition flooring, possessing qualities which commend use, is made by the Troegerlith Tile Co., 11 Broadway, New York. It consists of chemicals and fillers of the best quality obtainable, and contains neither Portland cement, sand, lime nor mortar. Asbestos is one of its chief ingredients, thus adding to its strength, warmth, resiliency and fire resistance.

It is laid in a plastic state, half an inch in thickness, in a single layer and it bonds directly to either wood, cement or concrete. The material is finished by troweling; takes its initial set in a few hours and may be walked upon after 24 or 36 hours.

In appearance, cleanliness, lightness (it weighs less than four pounds to the square foot when laid half an inch in thickness) and resiliency Troegerlith Composition Flooring ranks among the best flooring materials. It gives a floor that is quiet, easy on the tread and non-slippery. Good linoleum or wooden floors cost almost as much as Troegerlith Composition, yet are not so durable, attractive or fire-resistent.

The Troegerlith Tile Co. has issued a folder, descriptive of the flooring and its Cork Composition Flooring, that gives a partial list of residences and public buildings in which the floorings have been installed. It contains several illustrations. A copy may be obtained by addressing the company.

## SEAMLESS STEEL LEAKLESS TESTED TANKS.

The importance of high-pressure tanks, especially for an explosive like gasoline, cannot be overestimated, as only by proper handling can the danger of accidents be avoided. The procuring of a proper receptacle for containing gasoline is necessary. Gasoline as a liquid is highly inflammable; it vaporizes readily, and in its gaseous form it becomes a dangerous explosive when not handled properly.

The "Jasco" safety first tank, manufactured by Janney, Steinmetz & Co., Fourth and Market streets, Philadelphia, Pa., illustrated here, is designed and built to insure safety in gasoline storage on automobiles, motor trucks, motor boats, etc.

**Made of Drawn Steel, Seamless, Leakless, Tinned and Tested.**

Made of cold drawn steel, seamless, tinned inside and out with pure block tin, and tested to 300 pounds hydraulic pressure per square inch, "Jasco" tanks cannot leak and are improvements on the old fashioned riveted gasoline receptacles.

"Jasco" seamless tanks have no soldered or riveted joints to jar loose under the stress of travel and to spring a leak, and as they cannot leak they remove what is otherwise an ever present danger—a gasoline explosion.

Gasoline when pure will not attack any metal, but there is likely to be some foreign substance in it that will positively attack zinc, but not tin, the cause of such action being the presence of acid in the gasoline; of which there is a greater or lesser percentage at various times. As a rule gasoline is not the regular distillation of petroleum, but is manufactured from the heavier oils. Therefore, it is absolutely necessary that tanks used as containers of gasoline should be coated thoroughly and heavily with pure block tin to prevent any deterioration. As mentioned, "Jasco" tanks are so coated.

The tanks not only afford insurance against accidents from explosions due to leaks, but save the waste of gasoline and secure for actual use every drop of it, thus permitting economy in use.

Gasoline evaporates rapidly. One pint of it left in an uncovered basin in a room at normal temperature will evaporate entirely within 24 hours. As gasoline vapor is denser than the surrounding air, unless disturbed by active air currents, its presence in the room may be detected for many hours. One pint of gasoline will make 200 cubic feet of explosive mixture seven times more powerful than gun powder.

It is therefore important to owners of automobiles, motor trucks and motor boats that the containing tank used for gasoline be leakproof, and this condition cannot exist where the tanks used have seamed or riveted joints, as they are liable to open at the seams or rivets and thereby jeopardize life and property.

Janney, Steinmetz & Co. make a specialty of seamless tanks for gasoline, air and other service, and carry a large assortment in stock. Special sizes and shapes can be furnished quickly. Gasoline storage outfits, with seamless steel tanks, are manufactured also by the firm, and are described in the new publication, "Gasoline Storage Outfits," sent free on request.

Thousands of "Jasco" safety first tanks are giving safe, satisfactory service throughout the country, and the manufacturers report that the demand for the gasoline tanks, which cannot spring a leak under the roughest service, grows greater each month.

An illustrated catalogue, devoted to "Jasco" tanks, has been issued. It contains also descriptions of contents, indicators, cylindrical model rear tanks, etc., and it may be obtained free of charge by addressing Janney, Steinmetz & Co., Fourth and Market streets, Philadelphia, Pa. A book worth sending for.

## GUARDS THAT ELIMINATE DANGER SPOTS.

The Lockhart-Hodge Company, 25 Waverly street, Buffalo, N. Y., that in the past fifteen years has brought to a state of perfection guards for a large number of dangerous machines found in factories, especially woodworking machines, report a growing demand for Jones Safety Guards.

The aim of the company is to produce the best guards for dangerous machinery that, while protecting, do not decrease the operator's efficiency or output. Their guards are made with care, are self-adjustable, economical and mechanically perfect.

The Jones No. 1 Saw Guard, of which an illustration appears, is claimed to be the simplest and most efficient saw guard on the market. This guard is always over the saw, no matter how the table is tilted, and is adjustable up or down, to the right or left, easily thrown back and pushed to one side for up-end work or when changing knives; in fact, affords the two-fold duty of protecting the operator and enabling him to increase his production.

**Safe and convenient type of saw guard. The lower view shows the guards turned back for end up work.**

**Jones Joiner Guard. Easily adjusted and affords absolute protection.**

The Lockhart-Hodge Company makes also a specialty of special guards to meet all requirements of the shop manager who desires no "danger spots" in his plant.

## USE OF GOGGLES PREVENTS EYE INJURIES.

That the percentage of eye accidents to workmen is high is shown by a recent report of the Industrial Commission of Wisconsin, which states that more than 70 per cent of all the injuries to workmen caused by chips, nails and other small objects affect the eyes. Out of a total of 346 cases reported, 32 men lost the sight of one of their eyes entirely, 217 had eyes injured, 75 suffered from lacerations, 7 from impaired sight and 15 from bruises. The causes of the injuries were: Hit by chips, 283; by nails, 14; by stone from blasts, 4; by bursting water glasses, 3; by other small objects, 42.

The commission states that of the 70 per cent it is safe to say that fully three-fourths of the eye injuries could be avoided by the wearing of goggles; and that within the past year many Wisconsin plants have adopted the use of goggles, and as a result eye injuries have been eliminated almost entirely.

An illustration of the efficiency of industrial protection glasses is afforded by a recent case, in which a man, chipping fins off castings with a pneumatic chipper, had both lenses broken badly, but, due to the patent safety flange of his Willson Safety Glasses,

**New Type of Goggles.**

the broken glass was prevented from being driven through the frames, and thus his eyes were saved. Without the glasses the man might have been made blind, or, at least, had his eyesight injured seriously.

# UNDERWRITERS' LABORATORIES'

## Recent Approvals of Appliances

ACETYLENE CYLINDERS, HIGH PRESSURE "SEARCHLIGHT." The Searchlight Co., mfr., 1016 S. Michigan Ave., Chicago, Ill. High pressure cylinders made of steel. Designed for illuminating and welding purposes.

AUTOMATIC SPRINKLER. Esty Sprinkler Co., mfr., Laconia, N. H. Esty Issue "B" Automatic Sprinkler. H. G. Vogel Co., sale agents, New York, N. Y.

CABINETS, ELECTRIC. Detroit Fuse & Mfg. Co., mfr., 1400-1414 Rivard St., Detroit, Mich.

CABINETS, ELECTRIC. Large-Dall Mfg. Co., mfr., 114 N. 13th St., Philadelphia, Pa.

CABINETS, ELECTRIC. Superior Electric Mfg. Co., mfr., 2416-2418 University Ave., S. E., Minneapolis, Minn.

DOOR FRAMES, METAL. Hale & Kilburn Co., mfr., Lehigh Ave. and 18th St., Philadelphia, Pa. Frames for single swinging doors mounted singly or in pairs. Frame made of sheet steel, and consists of a head and two jambs formed of sheet steel channels of identical cross section. Members permanently fastened together before shipments. Jambs provided with anchors for attaching to wall.

DOORS AND SHUTTERS, METAL. Hale & Kilburn Co., mfr., Lehigh Ave. and 18th St., Philadelphia, Pa. Fire door for openings in vertical shafts. Doors made of sheet steel. Members of hollow construction provided with asbestos insulation.

FUSES, CARTRIDGE ENCLOSED. Multi-Refillable Fuse Co., mfr., 729 Fulton St., Chicago, Ill. Non-refillable cartridge enclosed fuses.

FUSES, CARTRIDGE ENCLOSED. United Electric Supply Co., mfr., 241 37th St., Brooklyn, N. Y. "United" cartridge enclosed fuses.

GAS SHUT-OFF VALVES. Lyons Machine Co., mfr., Cleveland, O. For Excel Safety Gas Valve Co., 342 Monadnock Block, Chicago, Ill. "Excel." Manually-operated gas shut-off valve made of brass, and provided with attachments for operating from a conveniently located pull box. It is designed to be used in emergency cases to shut off gas supply from buildings, and is closed by simple movement of a handle in an outside pull box.

GASOLINE ENGINES, STATIONARY. San Antonio Machine & Supply Co., mfr., San Antonio, Tex. Single-cylinder, horizontal, 4-stroke-cycle engines 4 to 35 H. P.

HOSE, RUBBER-LINED. Boston Belting Co., mfr., 84 Linden Park St., Boston, Mass. Cotton rubber-lined hose, either single, double or triple jacketed, and rubber hose, all sizes, for fire department use.

HOSE, GASOLINE. New York Belting & Packing Co., mfr., Passaic, N. J. A ¾-inch, 3-ply rubber hose designed to conduct gasolene.

HOSE, GASOLINE. Revere Rubber Co., mfr., Chelsea, Mass. A ¾-inch 4-ply rubber hose designed to conduct gasolene.

INCUBATORS AND BROODERS, ELECTRICALLY HEATED. Chicago Surgical & Electrical Co., mfr., 859 N. Franklin St., Chicago, Ill. This surgical incubator consists of an asbestos-lined case provided with a glass door, two candelabra lamp receptacles, a thermostat and a thermometer.

INSULATING MATERIALS. Kurzrock, F. C. H., mfr., Columbus, O. A treated sandstone for use as a substitute for slate in electrical appliances.

LAMP ADJUSTER. Gund Manufacturing Co., mfr., La Crosse, Wis. "Two-Ball Adjuster," consisting of two pulleys, one to be suspended from ceiling and other suspended on slack loop of cord.

MISCELLANEOUS WIRES. Chicago Insulated Wire & Mfg. Co., mfr., Sycamore, Ill. Flexible cable having slow-burning insulation, for use with picture machines.

PANELBOARDS. Large-Dall Mfg. Co., mfr., 114 N. 13th St., Philadelphia, Pa.

PICTURE MACHINES AND APPLIANCES. "Kinak" Motion Picture Co., Inc., mfr., 1777 Broadway, New York, N. Y. "Kinak" Motion Picture Machine, a portable, automatic, motor-driven, moving picture machine, complete with metal housing and paper screen, for advertising purposes, operating on principle of reflection and using an opaque positive paper film.

PICTURE MACHINES AND APPLIANCES. Motion Picture-Scope Co., mfr., Peoples Gas Bldg., Chicago, Ill. "Safety-Scope" portable, hand-operated, motion picture machine, made in two types, one having a tripod base and the other having mechanism mounted in a transite asbestos board case.

RECEPTACLES FOR ATTACHMENT PLUGS. Trumbull Electric Mfg. Co., The, mfr., Plainville, Conn. Flush receptacles, 660 W., 250 V.

RHEOSTATS, ETC. Westinghouse Electric & Mfg. Co., mfr., East Pittsburgh, Pa. Rheostats, 126 to 650 V., all capacities. Motor starters: Types D, DM, G, ZA, ZB. Starting and regulating; Types DA, DAC, DAS, DS, DC, H, HC, HS, I, IC, IS, ZC, ZD, ZE, ZF, ZG, ZH. Battery charging: Type DB. Field rheostats: Types J, JA, JB, JC, JD, JE. Resistance units: Type DE; also "Bobbin," "Bar" and "Grid" types.

ROSETTES, FUSELESS. Trumbull Electric Mfg. Co., The, mfr., Plainville, Conn. "Circle T," 3 A., 250 V.

SIGNS, ELECTRIC. Rosenfeld & Co., Inc., Eugen I., mfr., 8-10 S. Howard St., Baltimore, Md.

SOCKETS, STANDARD. General Electric Co., mfr., Schenectady, N. Y. Key. Cat. Nos. 29623, 29624, GE209, GE210, GE372, GE374, GE376. Keyless, 660 W., 250 V., Cat. Nos. 50766, 66237, GE225-GE-227, incl., GE373, GE375, GE377, 1500 W., 250 V., Cat. Nos. GE058, GE139, GE514, GE516. Candle socket, Cat. No. GE091, when installed with casing or "candle." Pull. Cat. Nos. GE222-GE224 incl. Also the above types with shadeholders attached.

SOCKETS, STANDARD. Peru Electric Co., mfr., Peru, Ind. Porcelain key socket.

UNDERGROUND STORAGE TANKS. Boyle-Dayton Co., The, mfr., Los Angeles, Cal. Underground storage tanks to be used in connection with Isolated Storage Systems, Inside Discharge Systems, Gasolene Engines, etc.

UNDERGROUND STORAGE TANKS. San Antonio Machine & Supply Co., mfr., San Antonio, Texas. Underground storage tanks, to be used in connection with Isolated Storage Systems, Inside Discharge Systems, Gasolene Engines, etc.

WINDOWS. American Sheet Metal Works, mfr., Carrollton Ave. and Edinburgh St., New Orleans, La. Hollow metallic window frames and sashes for wired glass: Double hung. Twin double hung. Double hung with stationary transom. Double hung with top hinged transom. Double hung with pivoted transom. Counterbalanced. Stationary. Twin stationary. Top hinged. Double top hinged. Pivoted upper. Pivoted lower. Pivoted upper and lower. Single pivoted. Twin pivoted. Triple pivoted. Tilting. Casement.

WINDOWS. Holmes & Bros. Co., A. E., mfr., Superior, Wis. Hollow metallic window frames and sashes glazed with wired glass. Pivoted.

WINDOWS. Moeschl-Edwards Corrugating Co., mfr., Covington, Ky. Hollow metallic window frames and sashes for wired glass constructed in following patterns: Double hung. Twin double hung. Counterbalanced. Twin counterbalanced. Stationary. Twin stationary. Pivoted. Reverse pivoted. Single pivoted. Multiple pivoted. Twin pivoted.

WINDOWS. Mesker Brothers Iron Co., mfr., Sixth, Poplar and Seventh Sts., St. Louis, Mo. Double hung window (knock-down type).

WINDOWS. Pomeroy Co., S. H., mfr., 282-296 E. 134th St., New York, N. Y. Hollow metallic window frames and sashes for wired glass. (Heavy Metal Type.) Double hung. Made of 16 and 24 U. S. gauge sheet steel, galvanized.

WINDOWS. Ringle & Sons, Jacob, mfr., 83 Newark Ave., Jersey City, N. J. Hollow metallic window frames and sashes for the protection of exterior openings. Pivoted.

WINDOWS. Watson Co., James H., mfr., Bradley, Ill. Hollow metallic window frames and sashes for wired glass in following patterns. Double hung pivoted.

WINDOWS. Watson Solar Window Co., mfr., 2502-20 S. Paulina St., Chicago, Ill. Heavy sheet metal window glazed with wired glass. Made in following types: Fixed. Single Ventilator. Double Ventilator.

# RECENT CATALOGUES OF SAFETY DEVICES AND METHODS

By writing the firms the publications may be obtained without cost.
Please mention SAFETY ENGINEERING.

## Chemical Engines.

Badger Fire Extinguisher Co.,
32 Portland St., Boston, Mass.

Literature concerning Badger's chemical engines for private estates, towns, manufacturing plants and institutions. The engines are simple, durable and effective, and they afford a "one man fire department."

## Danger Signs.

Enameled Steel Sign Co.,
222 North State Ct., Chicago, Ill.

Catalogue of danger and warning signs of enameled steel and iron; lithographed steel signs and embossed metal signs, showing many of the more than 300 styles of reading matter carried in stock. Of service to managers who wish to have durable, effective signs for "Safety First" uses.

## Fire Doors and Gates.

The Peelle Co., 123 Liberty St., New York.

Booklet describing "Peelle" fireproof doors and elevator safety gates and accessory apparatus. Many illustrations and a list of about 100 of the many buildings in which "Peelle" doors and gates are in use and giving satisfactory service.

## Fire Extinguishers.

Justrite Manufacturing Co.,
345 South Clinton St., Chicago, Ill.

All interested in preventing loss from fire and explosion by being able to immediately extinguish incipient fires from any cause, including gasolene and all other volatile oils and those caused by electricity, will find much of value and service in the new publication issued by the above company entitled "Safety First": Justrite Fire Extinguishers, Justrite Automatic Oil Waste Can, Justrite Safety Cans for Storage of Explosive or Inflammable Liquids, The Security Benzine Can.

## Fire Windows.

The S. H. Pomeroy Co., Inc.,
282-296 E. 134th St., New York.

A window to increase the renting value of any building is described in a publication just issued by this company and entitled "A New Fire Window." Especially adapted for the use of plate or polished wireglass, this Pomeroy Heavy-Gauge Double-Hung Fire Window represents the latest design in the long series of improved models in fire windows brought out by the company. Among other features of the window are great serviceability, dependability and low cost.

## First Aid to the Injured.

Norton Company, Worcester, Mass.

A complete and useful booklet under the above title, just off the press, based on the experience gained by the Norton Department of Health and Sanitation. Issued as a help to Norton employes, this booklet contains points and data of service to all who operate plants of any nature. The chapters on Safety Devices and Safety Men and Saving of Time are of particular interest.

## Hollow Metal Doors.

The Kinnear Mfg. Co., Columbus, Ohio.

Catalogue H-1, descriptive of hollow metal doors in a few standard types. Illustrated and of much service to those requiring such products.

## Self-Closing Fire Doors.

Victor Manufacturing Co.,
Newburyport, Mass.

Illustrated catalogue of fire doors and shutters and gravity heat closing devices. Forty-six pages; more than 80 illustrations.

# SAFETY ENGINEERING

Vol. 29 APRIL, 1915 No. 4

***ANNOUNCEMENT*—SAFETY ENGINEERING has assumed the subscription contracts of "Protection Engineering." This magazine is to be sent hereafter to the subscribers of "Protection Engineering," beginning with the March number.**

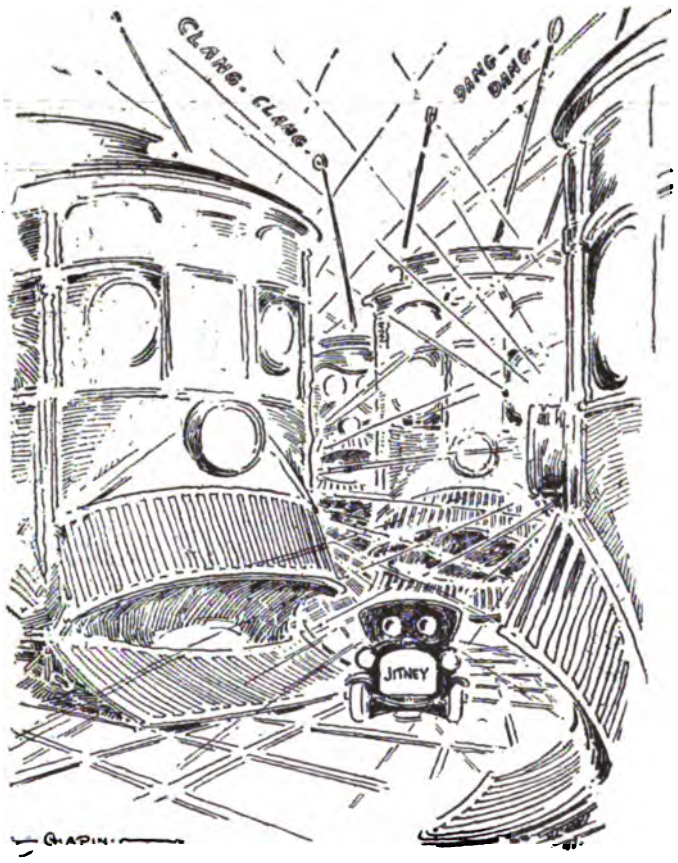
# *Current Comment and News*

ONE OF the notable events in the "Safety First" movement is the completion of the organization of the New York Local Council, No. 14, of the National Safety Council, with a strong board of officers and representative committees. Located in the metropolis of the biggest industrial State in the United States, opportunities are immense for the council to be active in preaching the doctrine of accident prevention in the local industries. In the greater city are more than 34,000 factories, with shop force of more than 641,000.

The labor of the National Fire Protection Association, which is to hold its annual meeting in New York in May, to reduce American fire waste, has extended over a period of 20 years. During the past five years the association has had the co-operation of progressive and influential national organizations. It has prepared and put into form for popular comprehensive engineering standards of fire protection and fire prevention. Building codes have been drafted and revised; extensive and efficient fire departments have been established; expenditures for water supplies and other physical means have been enormous, but they have failed, says the association's committee on public information, and they will fail, "to check the fire waste as long as the carelessness and indifference of the American people respecting it remain uncorrected." The committee advocates the early enactment in all of the States of a law that shall compel individual attention to this matter, by imposing legal liability for the results of carelessness and neglect.

Is getting himself killed or mangled on a railroad track such a right of the American citizen that to abridge it would be oppression? Is this one of those "natural and inalienable rights" to which all men are born according to the Declaration of Independence? Is the average American so attached to this right—does he hold it so dear and precious—that against serious efforts to take it away he would be moved to take up arms, or, at least, to vote solidly? The questions were asked by the Chicago *Herald*, that said thirty-six States of the Union appear to think it is, for they have no law specifically prohibiting persons not railroad employes from walking on railroad tracks. Even where there are city ordinances they are rarely enforced. Out of 339 persons arrested on the elevated rights of way of four roads in Chicago in three months only 67 were punished. Apparently the average American clings to the privilege of being killed or maimed on a railroad track as a precious possession. But should it be regarded, especially when we consider the widows and orphans it leaves, as a natural, inalienable and even "constitutional" right?

Commenting on the conditions that surrounded a fire in which two lives were lost by suffocation, the Manchester (N. H.) *Union* said that the evident fact that the fatal fire got its origin in the basement had brought out the point that the matter of cellar inspection was so far-reaching in its scope, and the territory so extended, that it was more than one man could attend to with the necessary follow-up visits that were demanded in the majority




From the St. Louis Republic.

**Breaking Into the Big League.**

of cases to ascertain if instructions for the removal of rubbish had been complied with. The superintendent of buildings said that the conditions of certain localities in Manchester were such as to require the presence daily of an attache of his office, because refuse and inflammable material accumulated quickly.

Eight Safety Round Tables, including 17 towns, have been organized in Wisconsin during the past three months through the co-operation of the Industrial Commission with the commercial clubs and manufacturers of the various towns. These Round Tables include from 50 to 125 superintendents and foremen and are modeled after the Merchants and Manufacturers Round Table. The list includes the following towns: Green Bay, Manitowoc and Two Rivers, Appleton and Kaukauna and towns between, Neenah and Menasha, Fond du Lac, Oshkosh, Sheboygan, Racine, Wausau, Brokaw and Schofield, La Crosse and Kenosha.

A "Safety First" laundry is part of the equipment of Cincinnati's new $3,000,000 hospital. It is equipped with the latest machinery for washing and ironing clothes at the least expenditure of human energy.

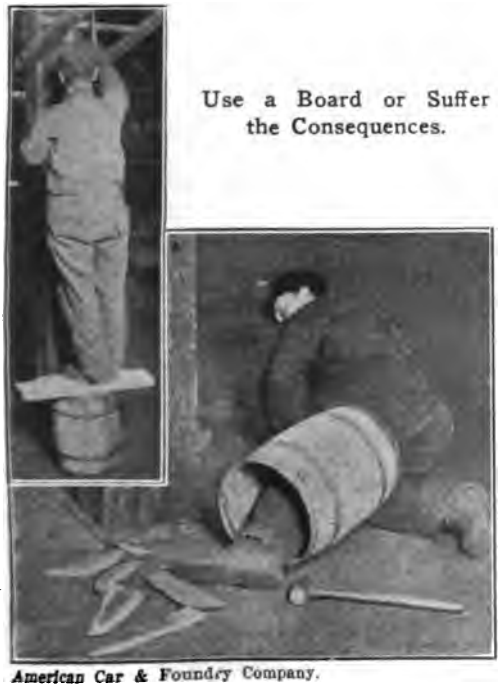
An appeal to its thousands of employes to lead a moral life as a means of increasing their own safety while at work and of improving their chances for promotion has been made by the Carnegie Steel Company as a part of a "Safety First" campaign. In a series of pamphlets which have been distributed among the men the company, by means of charts, shows how much longer a man lives who lives "right" than one who dissipates, and tells of the better school work done by children of the workman who leads a clean life, as compared with the children of one who does not.

The origin of the "Safety First" idea and the slogan is in doubt, says the *Mining Congress Journal*. It is practically admitted, however, that the expression, or some form of it, had early use in the mining industry, the matter of greater safety and accident prevention having been recognized at several mines and metallurgical plants a considerable number of years ago.

Heretofore, the fire loss in Tennessee has been so large as to constitute an economic crime, said the Nashville *Tennessean*. Every building burned is a complete loss. The fact that it is insured for a part or all of its value does not decrease the loss by a cent. The property is destroyed. That much wealth is annihi-

lated. The community is that much poorer, though the owner of the building may take the full value of his property out of the pockets of other men who pay premiums for protection against fire. No State that permits wanton and criminal loss by fire can ever enjoy a full measure of prosperity.

A report, superseding that of 1906, on the structural conditions and hazards in Louisville, Ky., says that the laws relative to building construction contain some good specifications, but omit numerous important points pertaining to adequate fire protection, and they are in conflict. Enforcement appears to be good, although the inspection force is not required to be qualified. The fire limits are inadequate; wooden shingle roofs are permitted outside of the limits, but use is not general. The most of the new construction in the congested value district is fireproof; general structural conditions have been improved considerably since 1906, but they are very weak yet. The laws relative to explosives and inflammables do not provide for adequate and suitable regulation of hazardous materials. The control is uncertain. In the congested value district the improved construction has reduced the potential hazard, although it remains high on account of the predominating weak structural conditions. In the district are several automatic sprinkler equipments. The fire-fighting facilities are adequate mainly. Serious block and group fires are probable.



Use a Board or Suffer the Consequences.

American Car & Foundry Company.

**Is getting himself killed or mangled on a railroad track such a right of the American citizen that to abridge it would be oppression.—Chicago Herald.**

An inspection of the structural conditions and hazards in Sheboygan, Wis., disclosed a need for good municipal ordinances and rigid enforcement with regard to building construction. Present structural conditions are weak. The laws relative to explosives and inflammables are deficient or lacking. In the principal mercantile district, although weak construction makes serious local fires probable, more than a single block should not become involved in a single conflagration. In the manufacturing district private protection lessens the conflagration hazard, but extensive conflagrations are probable because of inadequate water supply and extensive lumber yards.

Concerning the structural conditions and hazards in Lynn, Mass., a report superseding the report in 1908, says that the municipal laws relative to building construction are meagre and inadequate; that structural conditions

have improved since the previous report. Overhead wires create obstructions in parts of the congested value district and elsewhere; some are being removed. Serious group fires are probable throughout the congested value district, which is divided by a railroad embankment and open spaces. Weak construction, narrow streets, inadequate fire-fighting facilities and high winds of moderate frequency result in a moderately high conflagration hazard in the mercantile section and a moderate hazard in the manufacturing section, but both sections should not become involved. Sweeping fires are probable in the frame tenement districts. The flying-brand hazard is serious.

From the Grand Rapids (Michigan) Press.

## NATIONAL SAFETY MOVEMENT.

It appears to me that if owners of factories and employers of labor would exercise as much care in eliminating saloons from the vicinity of their plants as is at present shown by saloonkeepers in their endeavor to locate near factories, both employes and employers would be benefited.—*Dr. A. M. Harvey.*

The crux of the safety movement, with its features of efficiency and economy, involves a development of man power.—*A. T. Morey.*

Granted that in this country we are turning out some of the finest and safest machines that can be found anywhere, there is nevertheless a large amount of equipment made that ought never to be placed on the market.—*Dr. Lucian W. Chaney.*

A night-watchman who took our first aid course was able on the second day to successfully operate a pulmotor and thus revive a man almost immediately.—*H. E. Akerly.*

I cannot imagine any better way to maintain interest than to have employers send delegates to the National Safety Council congresses.—*R. C. Richards.*

Through the co-operation of manufacturers and the proper safeguarding of the machinery they turn out, the accident rate in textile mills is very low.—*Henry A. Hale, Jr.*

Keep the fire department out of politics, and have legislated the use of fireproof materials in building construction.—*J. J. Brennan.*

The department store furnishes one of the worst cases of danger to human life and property that can be thought of.—*Richard H. Borden, Jr.*

The fire-resistive building will rent for a much better figure than a non-fireproof building and will be occupied by a better class of tenants.—*C. W. McKeehen.*

I call to mind three serious accidents caused by sledgehammers, and involving the loss of arms.—*W. E. Firth.*

The time ought soon to arrive when no machinery manufacturer will sell a machine that he knows is unsafe.—*Dr. Lucian W. Chaney.*

It is to the interest of any workman to work with a "safe" man.—*R. C. Richards.*

Word must go down the line so that every foreman will know that from that time forward safety is an integral part of the ordinary business routine, and that they will be expected to do their part.—*C. W. Price.*

We inspect chains every six months and anneal them each time.—*L. A. Phelps.*

If you want to save your job and eyes, wear goggles.—*J. M. Wolts.*

# *Protecting the National Forests From Fire*

*By Allen S. Peck, Forest Inspector, Forest Service, United States Department of Agriculture.*

THE National Forests contain about 21 per cent of the standing timber of the United States, with a value of approximately a billion dollars. The capitalized value of forage on the National Forests is estimated at about $85,000,000, and there are also other resources that can be injured by fire. The first and most important duty of the Forest Service is to protect this enormously valuable public property.

There is a period every year in almost every forest region of the country during which the fire risk is very great, while at other times there is little or no danger from fire. The factors which determine the degree of risk are to some extent human, but chiefly climatic. A prolonged period of drought, with an occasional dry electrical storm, and with many campers and travelers abroad in the woods, offers combinations which always mean extreme danger for the forest resources of the nation. To meet such a situation as this the Forest Service expands its normal organization by employing from 2,500 to 3,000 or more forest guards and patrolmen. These are assigned to duties worked out for them in advance in a fire control plan, so that each man knows exactly what he is to do during the fire season.

Such a plan as this has been prepared for each of the 159 National Forests. These provide for the protection of the various forests, using the methods best adapted to the peculiar conditions in each. The plan covers means of prevention, the detection and location of fires, and the suppression of fires after they are located. In addition it outlines patrol routes, indicates the location of permanent lookout points and gives instructions for securing transportation and supplies for fire fighters, with many other details.

Except for about 18 per cent which are caused by lightning and 20 per cent, the cause of which can not be determined, fires on the forests have their sources in human action. The prevention of these man-caused fires, therefore, is obviously a very important factor in fire protection. Efforts to this end are many and varied, including the posting of fire warnings throughout the forests, the issuing of folder maps of the forests to tourists and others, with warnings and advice regarding the handling of camp fires printed on them, and the enforcement of laws regulating brush burning. Excellent results are accomplished and many fires prevented by the patroling of roads and localities frequented by tourists and campers, and also the patroling of railroad lines. The importance of this last is emphasized by the fact that over 26 per cent of the average number of fires which have occurred on the forests each year during the past eight years have been caused by railroads.

The experience of the service thus far, as well as of State organizations and private owners, clearly indicates that while the fire hazard can not be eliminated it can be reduced substantially by measures such as these. The greater portion of the fires set by human agencies are unintentional, or, in other words, the result of carelessness. Calling the attention of the public, therefore, to the importance of protecting the forests from fire and the appalling results which are likely to follow the careless use of fire in the woods should within another generation reduce the danger to a fraction of what it is now.

Well before the opening of the dangerous dry season on a National Forest the force is increased, and the fire plan becomes effective. Men are assigned to patrol routes and lookout points, the telephone lines are put in first-class working order, arrangements are made

with liverymen and the owners of motor vehicles to furnish emergency transportation, and with storekeepers for supplies. Tool caches located at strategic points throughout the forests are looked over and the stock of tools is replenished.

Forest firemen, or "smoke chasers," are stationed at temporary camps that have communication by telephone or heliograph with the lookout points. These men are furnished with food supplies and horse feed to last them through the season, and are expected to remain at their posts, awaiting the call to go to a fire. They are in constant readiness, and they lose practically no time in making a start once a fire is reported to them. The degree of efficiency in the lookout and patrol service which has thus far been developed is indicated by the fact that during the last fire season, which in the Northwest was quite as dangerous in many respects as the disastrous season of 1910, fully 77 per cent of all the fires that started were extinguished before they had reached an area of 10 acres. Only 1½ per cent of all the fires which occurred did more than $1,000 worth of damage, and the total damage to timber during the entire season amounted to little more than $300,000.

In addition to the permanent and temporary men who are hired regularly for fire control, each forest supervisor makes arrangements for fire fighting "militia" to be recruited from among the ranchmen, lumbermen and other persons who live, or are occupied, on or near the forests. All of these men who are available for fire fighting duty are listed and kept in touch with, and a certain number of them, whose services can be used to especially good advantage by reason of the nature of their occupations, are given appointments by the Secretary of Agriculture, with the understanding that they are to go to fires with the same promptness that would be expected of any other officer, and are to be paid for the time employed.

Whenever the topography of a forest makes it possible, lookout points are selected in such number as to cover the entire forest. Cabins with windows on

**BURNING VALUABLE TIMBER.**

**The worth of the National Forests in standing timber alone is estimated at $1,000,000,000. If it were not for the Forest Service the value would depreciate rapidly to the detriment of posterity.**

LOOKOUT STATION.

**Lookout stations look inviting, and the view is undoubtedly superb, but spending months there alone undoubtedly becomes monotonous, and is service in the true sense of that word.**

all sides are placed on these points, and each one is occupied throughout the dangerous season by a lookout man. This man is on duty practically all the time, day and night. His station is equipped, among other things, with a map and an instrument by means of which he can get the exact bearing of fires. He reports the bearing of any smoke observed by him to the ranger in charge of the district, who then attempts to secure a cross-sight on the same smoke from some other lookout by telephone. The two bearings of the locality of the fire are plotted on the map at the ranger station. The nearest "smoke chaser" is then ordered by telephone to the fire, or, if it appears to be larger than can be handled by one man, a crew of volunteers is secured and sent by automobile, wagon, horseback, or on foot, as conditions warrant, with tools and supplies for a day or more.

When, because of high winds, unusual drought, or inaccessible location, a fire reaches such proportions that it can not be put out by a small crew of men, operations are started on a large scale in accordance with plans for emergency organization which have been worked out in advance. Sawmills are called upon for their crews, railroads for section gangs, and labor agencies in nearby cities are also engaged often to recruit bands of fire fighters. Forest officers are summoned from adjacent forests to furnish the necessary overhead or supervisory force. Automobiles, wagons and pack horses are hired in such numbers as are needed and the bases of supplies established.

During the month of August and the early part of September of last year, when many forest fires were burning throughout the timbered regions of the Northwest, nearly 1,000 men were employed at one time on one of the Na-

RETREATING.

**A term applied usually in a military sense. Our forest fire soldiers despise the word, and their achievements indicate that the act is not resorted to often.**

**FEEDING THE FIGHTERS.**

**The upper picture shows how the food supplies are transported on pack horses to the stations from the base camp. The lower picture shows one of the stations, equipped to feed 100 fire fighters.**

tional Forests in Idaho. A large number of these men were hired in Spokane and transported in special cars to the railway point nearest to the forest. From there they were carried in automobiles as far as possible, and then marched to the headquarters camp.

Sub-camps were established at suitable points on the fire line, and the men distributed among them. Cooks and "flunkies" were selected and assigned to their jobs, cook tents were pitched, and telephone communication was established with the base camp. Contracts were made for the delivery of supplies which were hauled by wagon to the base camp and distributed to the line camps by means of pack horses. A large corral was built, and from it the pack trains started each morning soon after daybreak.

On the fire line the fire fighters were divided into crews, each under the charge of a crew leader or straw boss, one forest officer being in charge of the entire camp or division. The crews were strung out around the fire, and they put in the day clearing a control line, or

**WARNING FOR CAMPERS.**

**The Federal Government believes in "Safety First" advertising, as this picture indicates.**

"trenching" as it is called. This was done by cutting and removing all brush and snags and clearing away the litter down to the mineral soil. Occasionally the fire, when driven by a high wind, would burn up to some point in the fire line and drive the fighters back.

As rapidly as a piece of line was thus lost a new one would be started along the flank of the fire, gradually heading it as the wind died down toward night. Lunch and water were packed to the men on the fire line by the flunkies, and at night the day shift returned to camp and, after a hot supper, rolled up in their blankets. A small night shift, which had been resting during the day, then went out to patrol the line during the night to prevent the fire from creeping across the trench and to extinguish sparks which might fly over the line.

After the fires the men were paid by means of checks at a temporary office established in the field. They then went to the nearest railroad town where they cashed their checks at the local bank, if they wished, and were returned to the towns from which they came in special cars at the expense of the government. During the past season there was no difficulty at all in securing first-class labor in the Northwest. One hundred to 150 men were sent out of a single city every morning for nearly a week. Each man signed a contract of employment, which guaranteed him pay at the rate usually of 25 cents an hour while actually working and during travel time and also free transportation, provided he remained on the fire line for a specified number of days or until needed no longer.

**PAYING OFF FIRE FIGHTERS.**

**Fire fighters are paid at the rate of 25 cents an hour when actually on duty or traveling.**

Care was taken in selecting the men to be employed, men of good physique and experience in the woods receiving the preference for obvious reasons. Fire fighting is at best a dangerous occupation, and, while everything possible is

done for the comfort of the men, a week or several weeks of fire fighting in the mountains can not be considered in any sense a period of recreation. Only men who are accustomed to manual labor are fitted for a strenuous experience of this kind.

Besides the hard work which is expected of the men, there is always danger of injury from falling snags and other sources. Occasionally, also, a man unfamiliar with the country wanders off and becomes lost. Although several men were injured in the past fire season, only two were killed. This is in marked contrast with the season of 1910, when 78 men lost their lives in the forest fires of the Northwest. Injured men received immediately such attention as was possible with the aid of emergency kits and were then sent out of the woods by the best means of transportation at hand.

Fortunately, the act of May 30, 1908, which grants compensation to employes of certain branches of the government engaged in hazardous occupations, was extended about three years ago to employes of the Forest Service. Therefore, if a fire fighter becomes injured, and is incapacitated for work for any length of time from fifteen days up to one year, he may be reimbursed under this act for the time so lost at the rate of pay at which he was hired by the service.

Fire fighting is by no means a lucrative or pleasant employment, and as a matter of fact there is no desire to add to its attractions, since it is hoped and expected that the number of fires will decrease rather than increase year by year. While, therefore, fire fighting can not be regarded in the light of a recognized trade, or as a regular and profitable occupation, the advantage of, and in fact the necessity for, securing quickly ample and efficient labor when an emergency occurs, such as that of last summer, is obvious. The wages paid to fire fighters, though designed to cover the actual value of the labor required of the men, are not a measure of the spirit and public interest which, as a rule, prompt men to volunteer for the work. The men who are ordinarily counted upon for handling such fires as occur in normal seasons are residents of the locality, who are prompted to some extent by self-interest, where their property is involved, but on the whole almost entirely by the desire to promote the public welfare.

The results of the fire season of 1914 show very clearly that much has been accomplished in the past few years in developing methods of fire control and increasing the efficiency of the field force of the service. Furthermore the construction of 3,000 miles of road, 20,000 miles of trail, nearly 18,000 miles of telephone lines, 1,400 miles of fire breaks and 300 lookout stations, besides many cabins and other structures, has rendered accessible and, therefore more readily protected, many regions which in the early days suffered severely from fires. In other words, the construction of permanent improvements is one of the first essentials in developing efficient fire control plans.

As an example of how small fires are prevented from becoming conflagrations may be mentioned a fire which started on a California forest at noon on a September day last year. One hundred and fifty-five men were mobilized by automobile from surrounding towns at distances of 8 to 56 miles, and they started the clearing of the fire line at 5 o'clock in the afternoon. By midnight the fire was under control, having burned over only 1,900 acres of timber land, with a loss to the government of less than $3,000. Fully $200,000 worth of timber, directly in the path of the fire, was saved by the quick work.

On one of the Oregon forests a ranger stationed two miles from town received a report over the telephone from a lookout man of a fire 12 miles away. He saddled his horse, rode to town, secured four automobiles and 20 men, and was on the fire line within 48 minutes after receiving word of the fire. Such instances as these, which are multiplied many times in each fire season, are very satisfactory evidence that, in addition to reducing the fire hazard through enlightened public opinion, forest fires can actually be held to small areas and extinguished with relatively small damage through efficient fire control forces.

# FATAL FIRE IN TOLEDO HOTEL

AROUSED in the middle of the night, sixty-five guests in the rooms of the upper stories of the annex of the Niagara Hotel in Toledo, Ohio, were terrified by alarms of fire in a clothing store beneath. Their experiences were similar to those of guests in other hotels of flimsy construction, the burning of which has directed attention so frequently to the first and second stories of the building, was discovered by workmen in the street railway company's power house across the street, and by the night watchman of the hotel. The alarm was received at fire headquarters at 12:09 a. m., Monday, April 4. The night watchman, the night clerk and three bell boys ran through the corridors of the hotel,

**NIAGARA HOTEL, TOLEDO, OHIO.**

**View of the Interior of a Part of the Annex, Destroyed by Fire, Showing Flimsy Construction of Floors and Partitions.**

fire dangers. Unable to go to the street, many of them were trapped in their rooms and obliged to remain at windows, sometimes encircled by flames, until they were rescued by firemen. A man and his wife lost their lives. Six of the guests were injured, and the captain of a fire company fell into an alley between the main part and the annex of the hotel. Fortunately the number of guests was comparatively small at the time.

The fire, that started in the storeroom of a clothing company that occupied the pounded on doors, kicked in several doors and otherwise aroused the guests. One of the bell boys shut all of the iron fire doors that he could run to through the dense smoke. The boys were not able to go to the uppermost stories because the smoke was so dense and the heat so intense.

Adjoining the annex of the hotel was the house of a fire engine. The members of the engine company worked swiftly and effectively in rescuing the persons at the windows. When other

**Corner and Side of the Annex of the Niagara Hotel, Toledo, As They Appeared After the Fire that Destroyed the Interior.**

**Remarkable Photograph of the Falling of a Part of a Wall of the Annex of the Niagara Hotel, Toledo. Work of Firemen to Prevent Fall on Engine House.**

firemen arrived, nine minutes after the first alarm, the inflammable building was a mass of flames. Thirty-two streams were played on and into the building until nearly 4 o'clock.

A local newspaper said that there was not a window that did not have its group of fire-trapped guests, who appealed frantically to the firemen to save them. In their frenzy some of the persons acted as if they intended to jump from the windows, but they waited to be saved when they observed the active work of the firemen. A few of the guests lowered themselves from the windows of one of the lower stories and then dropped to the ground, but no one was injured seriously.

Describing the experiences of the guests the local paper said: "The cries of the trapped guests were blood-curdling. Men and women screamed in their madness at tops of their voices and stretched out their arms in a frantic appeal to the people below. Now and then a slender fork of flame would lick its way closer to them, moved by a sudden gust, and at such times it was feared that, despite the nearness of the rescuers, the delirious victims would hurl themselves to the pavement."

After the rescues the guests were taken to various places near the hotel. The majority of them were in their night clothes and without shoes.

One of the guests, a stage cowboy, used a lariat to lower himself from a window of his bedroom to the roof of the fire engine house. Two acrobats, a man and a woman, threw a mattress to the roof of the fire engine house, jumped onto it and saved their lives.

The body of a woman was found in a bedroom in the fifth story soon after daybreak Sunday morning. The woman and her husband went to Toledo from Adrian, Mich., to purchase furniture. The body was found face downward near the entrance to the room, the door of which had been kicked off its hinges. Over the face was a towel with which she had endeavored to prevent the inhalation of smoke. Evidently the husband had endeavored to escape but had been overcome by smoke, his body falling into the ruins.

The woman sacrificed her life to modesty. An employe of the hotel reported that he passed the woman's room and saw her running hysterically to and fro. He grasped her by the arm and endeavored to pull her to safety, but she drew back into the room, exclaiming, "Oh, I'll not go out there before all of those men in this fashion." She was clad scantly, but she had thrown a coat over her shoulders. The employe struggled with her, but was obliged to leave her, although he believed that she would escape.

The Niagara Hotel catered to persons in the theatrical business, and it had about 200 rooms, accommodating usually about 150 persons. The hotel was not crowded the night of the fire because theatrical troupes were "on the wing" after the closing of performances Saturday night. The main part of the hotel was damaged by water.

The annex was a five-story brick structure, connected with the main part at the third story by a metal-covered way that bridged an alley. The walls were of brick. The floors were of wood and the roof was of wood. The flimsy construction of the partitions caused the fire to burn and spread rapidly. The private fire-fighting apparatus consisted of hand extinguishers.

The building had the usual fire escapes and stairways, but one of the fire escapes was cut off by fire. For a time after the sounding of the alarm the firemen were handicapped in fighting the fire by their activities in getting persons out of the building.

The building was another instance of weak construction, inadequate protection against fire and the ever-present danger of numerous sleeping quarters above stores. The first and second stories were occupied by clothiers and outfitters, jewelers, piano dealers, dentists and keepers of a restaurant. Such business occupancies have dangerous fire hazards.

The accompanying illustrations of outer parts of the building indicate the construction of walls and the arrangement of fire escapes. The illustration of a part of the interior indicates the flimsy construction of floors and partitions.

# PORTABLE KEROSENE OIL STOVES AND HEATERS

*By Charles E. Worthington.*

THE portable oil stove in use for heating small quantities of liquids and for light cooking where much heat is not needed is usually of the "Florence" pattern, with cast iron font and wide, flat wicks. The danger of "explosion" is very slight, but the stoves are overturned easily and "flare ups" are common, sometimes igniting the contents of the font. In fact a "flare up," in its inception and results, embodies practically the entire hazard of the use of this class of stoves, and as a general rule its occurrence is inexcusable.

In order to understand more fully what takes place, it is well to rehearse a little of the technology of kerosene and of the method of its conversion into heat. Kerosene is a distillate of petroleum, from which the naphtha has been practically eliminated, but is lighter than the lubricating oils derived from the same source. It is clarified by the use of acids and rectified with caustic alkalies. The point established usually by law, at which marketable kerosene gives off combustible vapors to the extent that their ignition will ignite the body of the fluid (flash point) is between 100° and 110° F. It is not in anywise synonymous with or the equivalent of "coal oil," which is an entirely different product, not produced now in commercial quantities.

In the class of stoves we are considering a wick is used to carry the fluid to the point of combustion. The oil rises in this wick primarily by capillary attraction, which carries it to the top of the wick. Ignition of the oil at this point creates a partial vacuum which adds the force of suction, thus increasing the flow. This combination of forces is progressive to some extent and the combustion increases as the supply of oil increases, or, in other words, the flame "gains" for a certain period, requiring attention and regulation until the proper adjustment is attained.

But if the end of the wick were ignited in the open the wick would char quickly and only a heavy, smoky flame with little heat result. It is therefore necessary to supply air by a forced draft to provide a sufficient volume, which is accomplished by a "chimney," and to provide also a means of converging the forced draft far enough above the end of the wick to induce combustion at a point which will not tend to consume or clog the wick and at the same time near enough to vaporize the oil as it rises, which is accomplished by a nearly hemispherical slotted cap or "burner," the latter term applied to the cap and the auxiliaries which make the apparatus complete.

This consists of a ring of brass, screwing into a socket on the font. The center of this ring is closed by sheet brass through which a flat tube projects vertically (not usually continued below the flat sheet). This is the wick tube, and it is slotted on one side to admit of raising or lowering the wick by means of a small spurred wheel.

On the ring and about the base of the tube is a flat, perforated removable plate or strainer (for air) and above the top of the wick tube is the slotted burner cap, the whole being surmounted and enclosed by the chimney, which includes in the area of its base the entire area of the perforated air strainer plate. The plate serves also to regulate the flow of air and prevent sudden overdrafts.

This detail is given to show more clearly why a careful adjustment is necessary to procure good results and to explain more clearly certain hazards.

The oil rises in the wick by capillary attraction and is accelerated by the action of combustion as long as the end of the wick is not obstructed. To avoid this the point of combustion is fixed slightly above the wick, but the distance is variable, and it must be increased as the maximum of combustion is reached; i. e., the wick requires to be lowered after the flame has burned for a short time.

If the wick is too low it gets below the converging draft, the wick chars and the flames becomes heavy and smoky; if

too high very much the same process goes on above the point of convergence, clogging the wick and forcing oil out laterally to ignite on the sides of the wick, which is to say "the lamp is turned too high and smokes."

If the smoking be all, we need not mind it, but with too high a wick comes an increase of heat below the burner cap, because the convergence of air to carry the heat up the chimney is interrupted by an expansion of air below the converging point. It heats the wick tube very hot, and in turn the flat brass sheet at its base gets very hot. The brass is in contact with the vapor within the font and that heats and heats the oil, which gives off more vapor, some of which forces its way up the tube past the wick to further increase the flame.

After awhile the base sheet gets hot enough to ignite the vapor in the font, and if the oil is low, and there is consequently a good mixture of air, an explosion may result. Usually, however, a vent is forced through the base sheet and the whole concern simply burns out, with some possible overflow of oil because of the pressure within the font.

Usually, however, the origin of the "flare-up" is due to a wholly different cause. We have explained that the oil will rise to the top of a clean wick. If the end of the wick is charred and swollen the oil will pass laterally into the wick by absorption; then gravity will take it down the outside of the wick or wick tube, and as this sets up a vacuum in the wick more oil will follow. This runs down the wick tube and accumulates about the base of the tube on the plate and on the top of the font under the perforated air strainer (virtually a concealed space). A little dust and dirt serves to hold a considerable quantity of oil. If the strainer plate is dirty, the oil will also accumulate on the top of that, obstructing the draft, which would necessitate getting air down the chimney under some conditions.

All of this gets hot long before the font and its contents heat, and it is there that the blaze or "flare-up" usually begins, a slight back draft above the chimney or a slightly imperfect adjustment of the wick, or increase of heat due to clogged or charred wick being the immediate cause; then the tube and the plate heat.

All of this is said merely to establish certain facts, viz.: If the wick is trimmed properly and also adjusted properly shortly after lighting; if the font is full of oil, leaving little vapor space above it, and the perforated air strainer plate and all of the parts of the burner and font about the base of the wick tube and under strainer plate are clean, no "flare-up" is possible; therefore no "explosion."

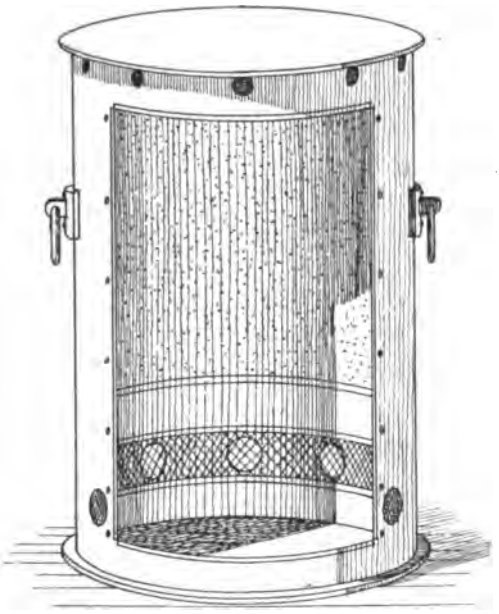
But, to insure immunity, not only must the wick be trimmed carefully; the chimney, hinged usually, must be turned back, the strainer plate lifted from the font and cleaned thoroughly, so that all perforations are unobstructed and the territory about the base of the wick tube, including that shielded from sight by the strainer plate and chimney when in position, be made perfectly clean. When not in use the top of the wick should be just below the top of the tube.

"Blowing down the chimney" does not blow flame into the font—there is no opening for that—but if there is an accumulation of hot oil and oily dust on and below the air strainer plate the flame will ignite that accumulation. It is dangerous only with a dirty burner, and as the concealed spaces are dirty in most instances, it is usually dangerous to blow down the chimney to extinguish the flame. It is well never to do it, since one cannot stop to examine in advance the condition of the danger point. The first consideration, therefore, is daily trimming and thorough cleaning and care.

The remaining hazard is best met by standing the stove in an iron pan (the ordinary baking pan of pressed iron is suitable) large enough and deep enough to hold at least twice as much oil as the font will hold. This provides means of caring for any overflow, either of oil in the font or of material on the stove. The whole affair can generally be removed by means of the wire handles at ends of pan. The surface on which the stove is supported is protected and the danger of the stove being overturned accidentally is minimized. Where used in stores or fac-

tories the use of the pan should be insisted upon in every case.

Much of the foregoing applies to oil heaters, which have their own problems. The heaters usually have what are termed "round wick" burners. The wick tube consists of two brass cylinders separated and held in position by a vertical rib, the inner cylinder being closed centrally to form a deep cup or well. The wick usually is not woven round but flat and just wide enough when bent into the tube to reach the rib on each side. The method of raising and lowering the wick is similar to that used for flat wicks. The upward draft is procured in the same manner, the sheet iron cylinder forming the body of the heater doing duty as a chimney. There is no burner cap, as a rule, the strong draft being relied upon to secure combustion at the proper point. There are frequently numerous perforations in the sides of the stove body and usually many of considerable size in the top, which is generally of cast iron.



Cabinet for Heater.

The points of hazard are the same as those in the flat tube burner, the central well and perforated top affording an excellent opportunity for the accumulation of dust and oil and the large perforated draft plate provides a considerable semi-concealed space for like gathering.

This, of course, is a loose, general description, as there are many varying types, all, however, embodying these features in varying modifications.

Flare-ups in these heaters are likewise the result of lack of care in cleaning and in regulating the height of the wick, and the hazard of igniting vapor or oil in the font is about the same and brought about in a similar manner.

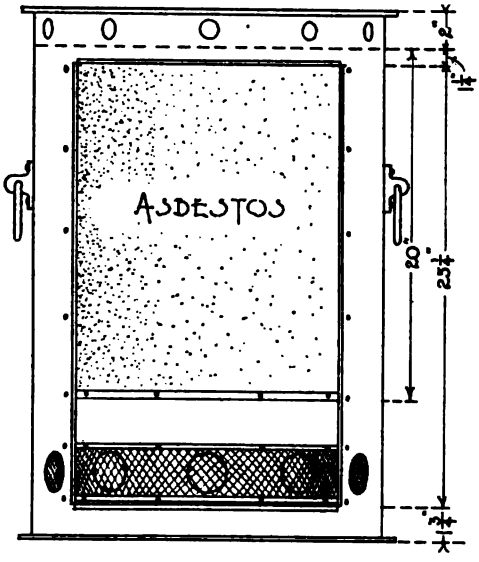
The greatest hazard of the oil heater is in the very quality that makes it useful, its portability. It is a portable heating device, and as such it has come to be almost indispensible for places where wood or coal stoves are impracticable and there is no gas.

The fact that it can be carried about involves the liability of so placing it that it is in contact with or in dangerous proximity to combustible material. It is pushed under a bench or table, with, possibly, only an inch or two between the top of the heater and wood; material is thrown upon it, checking draft and inviting a flare-up; the partly open top is a constant invitation to dust and flying material of all kinds to go through and find rest in the well of the burner and finally ignite, and it is left unattended for considerable periods.

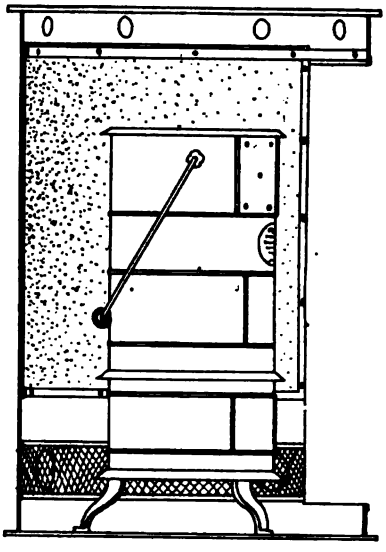
Of course, against lack of cleanliness there is no protection as long as the neglect continues. As against contact with combustible material, under benches and the like, it is evident that no stationary protection is available, because the heater is portable and is not used constantly in any one location. The protective device must be as readily portable as the heater itself, and not heavy, unsightly or cumbersome.

About eight years ago this problem was brought forcibly to the attention of a corporation, making apparently necessary use of a considerable number of oil heaters; at least no practicable substitute for them could be found.

Under the spur of necessity an enclos-




ELEVATION



SECTION

SPECIFICATIONS.

Cylinder of 24-gauge galvanized iron, 30¼ inches high, 20 inches in diameter; top and bottom of same material; double seamed at joint on circumference and oil tight. In one side an opening 18 inches wide (measured on the circumference) and 25¼ inches deep; the top 3¼ inches below top of cabinet and bottom of opening 1¾ inches above bottom of cabinet; edges of opening rolled over No. 4 wire to stiffen.

An inner top 2 inches below top of cabinet tightly shutting off space which is ventilated by ten ¾-inch holes punched at regular intervals about 1 inch on centers below top of cabinet.

About bottom of cabinet seven 2-inch holes about 3½ inches on center above bottom, protected on inside by a strip of 50-mesh brass wire gauze completely covering them, gauze being held in place by strips of galvanized iron about edges securely riveted at proper intervals to side of cabinet.

Interior of cabinet lined with ⅛-inch asbestos mill board (flexible), extending 20 inches downward from inner top and to the opening at side; held in place by strips of galvanized iron at edges riveted to cabinet at proper intervals. Iron drop handles about 10 inches below top, riveted to cabinet and equidistant from opening.

Especial care to be used in making bottom double seam oil tight. No solder to be used in constructing the cabinet.

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ing movable galvanized-iron cabinet was devised, with a pan bottom of sufficient capacity and a double ventilated top, the whole resembling a metal barrel, with part of one side cut out.

It appeared to fulfill all attainable conditions of safety. A part of it was lined with heavy asbestos, and it could be placed under a bench or against wainscoting with entire safety. The arrangement increased the heating capacity of the heater. In case of flare-up or overflow, cabinet and heater could be removed quickly, without injury or serious discomfort to the operators.

The experiment was followed by complete adoption. During the eight years where these cabinets have been in use there has not been a single fire claim on account of an oil heater.

The device is not patented nor patentable, having been made and sold to an extent to make a patent impossible, and it has demonstrated its efficiency. It is not heavy, cumbersome, unsightly, nor expensive; it does not diminish the heating capacity of the heater. It can be made in any good tin or cornice shop. Cuts and specifications for the cabinet accompany this article.

The suggestion is that enforced use of the protective device would, by practically abolishing the principal hazard, permit the use of the heaters in many situations where convenience almost approaches necessity and the dangers attendant upon their use without protection have barely served as a deterrent, and also minimize the hazard where such heaters are in use.

A cabinet constructed to these specifications should not, while containing an ordinary oil heater in full normal operation, become sufficiently heated at any point to endanger even highly combustible material in actual contact, although experiment in that direction is not recommended.

It might be added that the corporation mentioned as having developed this device considers he cost as a low payment for the convenience of using the heaters and would be unlikely to entertain any proposition for discontinuing their use. wherever oil heaters are required.

## AUTOMATIC SPRINKLERS AND BUILDING CONSTRUCTION.

Frank D. Chase, president of the Chicago chapter of the National Fire Protection Association, in an address on "Adoption of N. F. P. A. Standards by State and Municipal Action," made the following reference to the influence of automatic sprinklers on building construction:

"Today buildings are designed not primarily by architects, but by engineers, and it is a question, first, of the engineering design, and second of the architectural design. We find, however, when we come to draw up our code and when we come to design our building, that it makes little or no difference whether we design a good building or a poor one—that we can, by the very simple expedient of installing a sprinkler system, bring our insurance rates down to a common level. A premium is put on the inferior construction by reason of the preference given the sprinkler. Stop to realize what this really means. It means that throughout the entire country, affecting millions of people, thousands of communities, we can build any old thing, if we sprinkle. Sprinklers do stop fires. A gentleman at the fire prevention congress in Philadelphia spoke as follows:

"'I would leave out division walls, and elevator and stair enclosures if necessary, but I would sprinkle it.' That referred to the building of ordinary combustible construction. This may be good engineering for some high-grade, well-inspected factories, but I think it's a mighty poor and unscientific way to build our cities. Let us not encourage the practice of figuring on the most expensive system of sprinklers now required, and then seeing how cheaply we can build. We should design our buildings the best we know how—and then put in sprinklers, and give a rating on a system with a 4-in. pipe as a maximum. It will take care of 90 per cent of our fires. Everyone, and the sprinkler companies most of all, would be benefited, if this association would do a little internal legislating to alter our sprinkler installation standards."

Mr. Chase is a logical proponent, but he is too low in his percentage. Of 14,353 fires extinguished with automatic sprinklers, 13,873, or 96.7 per cent, were extinguished with 75 sprinklers or less, more often less. And a 4-inch pipe is calculated to supply 80 sprinklers.

## WHEN THE HOUSE TAKES FIRE.

*Issued by the City of North Yakima, Wash.*

Used early, a glass of water has more value than a fire brigade. If the amount of water at hand is limited it should be thrown by handfuls rather than in a single dash. A bucket of water and a broom to sprinkle it constitute a good extinguisher for a starting fire. Don't throw water at the blaze—much less at the smoke—but upon the material from which the blaze comes. A coat, a rug, a bed cover, or a few pounds of flour can be used to smother a small blaze and a feather bed will choke a quite rapacious fire.

There is a general lack of the "Safety First" idea both among the employers and the workmen in the building trades.—*A. E. Davidson.*

## "NINE YEARS AFTER EVENT."

The ninth anniversary of the San Francisco conflagration is to be celebrated on April 18-24 under the auspices of the Panama-Pacific Insurance Club. The programme of the "Nine Years After Event" said that because "Insurance Day," April 18, fell on Sunday it was to be celebrated by a mass meeting in the Municipal Auditorium and that sermons were to be delivered in the churches on the subject of "The Victory of the Industries of Peace," the foundation for the sermons to be the rise of San Francisco in nine years.

The preamble of resolutions at a meeting of clergymen said:

The city of San Francisco was visited by a devastating fire on the eighteenth day of April, 1906, the destructive character of which was as great as that of any cataclysm known in history.

During the past nine years the world has witnessed the rise of San Francisco to a position stronger and more enduring in every respect than before the fire, and crowned by the world's greatest international exposition, thus presenting in concrete form a contrast with the cities of the Old World that failed to recover from the catastrophies that visited them.

The city of San Francisco, built on this western outpost, is a geographical center, with the fast-growing trade between the Orient and the Occident, and stands as a preeminent illustration of what modern civilization may achieve through avenues of peaceful pursuits, as contrasted with periods when might and the sword prevailed.

And furthermore, from a careful analysis of the statistics and facts that contributed to the rehabilitation of this city, it appears to us to offer the most striking illustration of the great forces that made it possible. And chief amongst such forces we recognize that throughout, and by reason of, the long period of peace enjoyed by this nation, there has developed a co-operative life, in which the brotherhood of man has been the primal factor. Thus, when the city suffered in the destruction of property to the extent of several hundred million dollars, the means for its replacement had already been provided for, through that co-operative spirit known as "Insurance" to the end that the burden of this city's reconstruction fell very largely and evenly through that part of the civilized world of leading commercial activity. Nor does the fact that a commercial spirit entered of necessity in the act diminish the force of the altruistic life thus presented.

In recognition of the facts, and the lessons they conveyed, the clergymen resolved to have services on April 18.

The proposed proceedings on "Disease and Accident Prevention Day," April 20, were the showing of "Safety First" films in theaters, sanitation exercises in the government building at the exposition, parade, with floats of corporations engaged in safety work, health and life conservation tableaux at the exposition grounds and a special demonstration by the United States life saving crew.

The proceedings for "Fraternal Day," April 22, were a parade, with automobiles, floats, etc., and exercises on the exposition grounds.

For "Fire Prevention Day and Fire Insurance Day," April 24, the preparations were extensive, including a parade of representatives of fire insurance companies and organizations, firemen, apparatus and floats, competitive exhibitions and drills with ladders, etc., closing with the burning of a ship in the bay, the fire to be extinguished by a fire boat.

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## PHILADELPHIA'S FIRE MAP.

The accompanying section of a map, from the annual report of Fire Marshal George W. Elliott, shows the location of some of the fires that occurred in Philadelphia in 1914.

Into the original map in the fire marshal's office a black pin is placed for each fire. When five fires occur in a city block, the five black pins are replaced by a brown pin. Whenever a brown pin appears an investigation is made to determine the cause of five fires in a city block, and, if due to faulty conditions, the latter are eliminated.

Similarly a white pin is placed for 10 fires and a red pin for 15, and a rigid investigation results. In Philadelphia last year it was not necessary to use either a red or a white pin, except in the case of two large dumps.

A study of the map, the first of its kind ever used in the city, shows not only the large number of fires in a year and the vital need of fire prevention, but the large area in which the fires occur. While the area between the Delaware and Schuylkill rivers and from Vine street on the north to Tasker street on the south shows the greatest number of

# SECTION OF PHILADELPHIA'S FIRE MAP

The dots indicate the places of fires in 1914. In the original map a black pin is placed for each fire. When five fires occur in one block a brown pin is placed for the five black pins; white pin for ten fires and red pin for fifteen fires.

fires, no section is free from the great burden of fire loss.

Considering the population and the number of old structures in the area mentioned, as compared with newer structures, and the absence of factories in the great residential sections, the proportion of fires is distributed fairly equal.

A careful study of the map is recommended to every citizen who is willing to help in the fight against fire waste. "Pick out the section where you live, note the number of fires, and see what you can do to decrease the number," Fire Marshal Elliott remarked in a bulletin that described the map.

## SPRING INSPECTION OF FIRE APPARATUS.

As winter is past and there is no danger now from the freezing of fire apparatus, the Factory Insurance Association of Hartford makes six suggestions, suited to the season, to property owners whose premises are sprinklered:

1. Examine all pipes and sprinklers where water has been turned off, and be sure there are no low points or traps where water has accumulated, frozen and burst the pipes. This should be done before water is turned on, to prevent leakage and possible water damage.

2. Where water has been turned off from sprinkler pipes, be sure to wash the rust and sediment out of mains before turning on.

3. Where valves without indicators are to be opened or closed, be sure to determine the proper direction to turn them, and when positive they are as required (open or closed) then seal them with riveted strap passing through hand wheel on valve and around the pipe.

4. If there are any leaks when pressure is turned on underground pipes, make prompt repairs, so that water may not damage underpinning or flood basements.

5. Try all hydrants while under fire pressure to see that they open easily, and where necessary apply lubricants.

6. Make actual test of fire pumps, through several lines of hose, working pumps to full capacity.

## STOVE POLISH HAZARD.

In a special bulletin on "Benzine Stove Polish" the fire marshal of Wisconsin says that many benzine stove polishes are manufactured of practically the same ingredients, the only difference being in the name, and that all of the polishes are equally hazardous. "In the past eight years there have been more than 400 serious accidents in the United States on account of the use of the benzine stove polish compound."

The hazard of using the polish is greater when it is contained in a brittle receptacle, such as a glass bottle, than when contained in a metal can. With either form, an open light in the room in which the polish is used involves a further serious condition.

Extracts from the bulletin:

The seriousness of using this particular polish can be best understood by the attitude taken in regard to this matter by the manufacturers. The manufacturers of benzine stove polish have given this department every encouragement in endeavoring to prevent its manufacture and sale. However, as they are not in a position to prevent benzine polish being placed on the market, inasmuch as all could not be induced to give up their business in this line, they are compelled through self-preservation to manufacture and sell this commodity. I quote here from a communication received from a Wisconsin manufacturer, as follows: "We had and always did consider them (benzine stove polishes) very dangerous and classed them among gun powder and dynamite." Another manufacturer writes as follows: "Not a day passes but that we hear of some minor accident, reported by our salesmen calling on the trade."

Benzine polish is usually found on the shelves of the grocery stores which have as their customers the poorer class of people. This would appear to be due to the fact that the over-busy housewife, having in most cases no domestic help, is constrained by force of circumstances to economize on time in every possible way. The benzine causes the polish to dry quickly, and this fact, of course entailing less work, recommends it to this class of householders.

We would caution all householders to use only fireproof stove polish, whether in liquid, powder or paste form. All stove polishes other than benzine polish can be safely used, and just as satisfactory results can be obtained, especially if a few additional minutes are given this duty. And is it not worth our while to devote a few extra minutes and thereby save this enormous sacrifice of human life? In short, is it not better to be safe than sorry?

# USE OF WOOD IN BUILDINGS

## THE RIGHT AND THE WRONG WAY TO PROMOTE IT

A NOTABLE gathering of lumbermen assembled in Chicago recently for the purpose of beginning the work of the proposed Forest Products Federation, an organization that was fostered by the National Lumber Manufacturers' Association and has been commended by all other lumber associations.

Robert D. Kohn of New York, president of the National Fire Protection Association, addressed the federation on "The Right and Wrong Way to Promote the Use of Wood in Buildings."

Mr. Kohn said he was not only interested in the National Fire Protection Association, but as an architect of long experience he represented the views of a large body of people who use timber. He said the lumbermen themselves could make or mar the development of the proper uses of wood. If they adopt the plan of holding fast to what they have and fighting every new material, whether good or bad, that might come into competition with them, or, if they adopt the method of fighting all legislation that appears to restrict the use of wood they will have taken a stand detrimental to their business and sure to result in a restriction of the uses of their product.

On the other hand, they could accomplish much by adopting a democratic plan of action, which means that they should study the proper uses of wood, thus preparing themselves to go before legislative bodies and speak with authority when matters of legislation seemingly adverse to lumber interests would arise. He told them that only after they can speak authoritatively as to the safe uses of wood could they rightfully speak at all. As an organization and as individuals the lumbermen can further their interests when properly prepared by preventing unwise legislation that would result in restricting the use of wood.

Speaking as an architect and as president of the National Fire Protection Association, Mr. Kohn said that the use of wood-flooring, if properly laid, does not increase the fire hazard in the high buildings, but the lumbermen have yet to prove this fact.

He further said that in high buildings properly constructed wood trim properly applied does not increase the fire hazard, but this fact has not been proved by the lumbermen to the satisfaction of those responsible for the adoption of certain building codes in the East; hence wood trim is prohibited in building above a certain height. Mr. Kohn expressed his opinion that the fireproofing of wood could not be made effective and that architects would not favor the use of fireproof wood because of the difficulty encountered in working it.

He said among the questions to be studied and properly solved was, "How can wood trim be properly used?" Because of the ease with which wood lends itself to ornamentation he and other architects preferred to use it rather than the more somber metal trim with which little artistic effect could be secured, but there is need for education along the line of how properly to use wood trim.

Another question with which the architects are confronted is where to go to get the proper kind of wood for flooring. They have experienced much difficulty and inconvenience through the appearance of dry rot in flooring, resulting, of course, from the use of improper material.

Mr. Kohn expressed the hope that the Forest Products Federation would organize a strong committee to make adequate tests and recommend the proper use of materials in wood construction. The work of such committee will be welcomed by architects and builders, and should result in dissipating much of the prejudice against wood that has arisen because of the use of improper materials and the prevailing idea among architects, especially in the East, that the right kind of wood could no longer be had.

Mr. Kohn said that the American Institute of Architects, of which he is a member, has a special committee on building codes. In New York where a

new building code is now up for consideration there is a joint committee, consisting of architects, consulting engineers, carpenters, masons, steel workers, etc., and each clause in the building code is submitted to this joint committee for consideration and discussion in an effort to get at what is right. He said that it had pleased him to note that the carpenters on the joint committee had voted in favor of a certain clause restricting the use of wood because they said in this case it was right. He expressed the hope that the lumbermen would not feel that the National Fire Protection Association is fighting the proper use of wood. It has a committee now engaged in studying the proper uses of wood, and he hoped that the lumbermen's organization would co-operate with this committee with a view to finding out the right thing to recommend.

In the discussion that followed E. H. Shafer, of Seattle, Wash., asked Mr. Kohn if in the East the same differences existed in the insurance rates between buildings of mill construction with sprinklers and fireproof buildings without sprinklers, this difference on the West coast being about 70 per cent in favor of the mill construction building with sprinklers. Mr. Kohn replied that the difference was practically the same in the East, but that in the East they had found it impossible to get the proper timbers for mill construction. He further said that if the Edison fire had demonstrated anything it was that a fireproof building without sprinklers and without adequate inner partitions and fire doors was a hopeless risk.

Dr. Hermann von Schrenk, replying to the statement of Dr. Kohn that eastern architects found it impossible to get proper timber, said there is 100,000,000,000 feet of such timber in the South. Mr. Shafer also said that there were billions of feet of timber in the West and that the kind of timber is growing in the South and West today that has always grown and that there is no reason why eastern architects cannot secure the right kind of material if they desired.

Charles S. Keith, of Kansas City, asked Mr. Kohn what the attitude of the architects would be if a standard specification for construction timbers is adopted and the manufacturers put their stamp on it, guaranteeing the timber. To this Mr. Kohn replied that that is what the architects are waiting for, and that if this plan is adopted timber construction will go into the specifications of every architect in the country.

J. E. Rhodes, of New Orleans, stated that the lumber industry does not wish to force its product on the public for purposes for which it is not suitable. He thought it unfortunate that behind the fire prevention propaganda there should be the hand of substitute interests, who have taken advantage of this opportunity to create a prejudice against wood. He congratulated the lumbermen on the sincere desire manifested by them properly to further the use of wood, and pledged the support of the Southern Pine Association in the proposed work of the Forest Products Federation.

## ENGINEERING CONGRESS.

Volume III of the transactions of the International Engineering Congress in San Francisco, September 20-25, will comprise an important series of papers on the general subject of municipal engineering. The field is to be treated under nine topics, covering the general subjects of city planning, streets, drainage, disposal of waste, water supply, protection against fire, transportation, public utilities and rural highways. Approximately twenty papers are expected, prepared by authors representing six different countries. The volume is to be illustrated with charts, diagrams and half tones.

The reports on transactions of the congress are to appear in from seven to nine other volumes, covering the various fields of engineering work. Membership in the congress, with the privilege of purchasing any or all of the volumes of the proceedings, is open to all interested in engineering work. For full particulars apply to W. A. Cattell, secretary, 417 Foxcraft Building, San Francisco.

The confusion and financial loss attendant upon every disastrous industrial fire is too well known to need comment.—*L. A. Phelps.*

# INDIVIDUAL LIABILITY FOR FIRES

IN VIEW of the reckless and increasing waste of property by fire, and the failure of other efforts to interest the public in measures for its own economic salvation, the Committee on Public Information of the National Fire Protection Association has advocated the early enactment in all of the States of a law to compel individual attention to the vital matter, by imposing legal liability for the results of carelessness and neglect. Such laws and ordinances have been operative in European countries for a century. It is in America only that careless individuals meet no restraint in their reckless destruction of the collective national wealth, the committee has declared.

The text of the suggested bill to fix personal liability for fires due to carelessness or neglect:

(Persons introducing the bill will supply the necessary prefixes, etc., to fit the local State form of enactment.)

SECTION 1. Any person, persons or corporation for any fire caused by, resulting from, or spreading by reason of [the negligence of such person, persons or corporation or] the noncompliance with any law or ordinance or lawful regulation or requirement of or by any State or municipal authority, shall be liable: (1) for all loss, expense or damage caused by or resulting from such [negligence or] noncompliance; and (2) for any expense incurred by any municipal or other governmental agency in extinguishing or attempting to extinguish any fire so caused, resulting or spreading.

SECTION 2. In all actions against any person, company or corporation for the recovery of damages on account of any loss or injury to any property, real or personal, occasioned by fire communicated from property owned by one party to property owned by another party, the fact that such fire was so communicated shall be sufficient evidence to charge the occupant of the property in which the fire originated with negligence, and place the burden of proof upon him.

SECTION 3. This act shall take effect.....

The bill, in its present form or modified slightly, was introduced in many legislatures in session in 1915. In certain States the words enclosed in brackets [ ] were omitted; in others section 2 was omitted. In one or two States no liability was named except for expenses of fire department (Clause 2, Section 1).

In a pamphlet the committee of the N. F. P. A. has published opinions on the subject. Some of the opinions:

Robert Adamson, fire commissioner, New York: I think it is desirable to fix legal responsibility for fires due to carelessness or neglect, because, if people know they will have to pay for the consequences of their negligence they will be careful. This very knowledge will result in a very great reduction in the number of fires.

James M. Curley, mayor, Boston: The bill I have introduced in the legislature provides that the person whose wilful negligence causes a fire in the city of Boston shall be responsible in damages to persons who have suffered damages to their person or property by such negligence, and shall also be liable to the city for the expense caused to the fire department in putting out a fire caused by such negligence.

John A. O'Keefe, fire prevention commissioner for metropolitan district, Boston: I should favor legislation that would, after some proper procedure in court, prevent the man whose negligence had caused a fire from recovering his insurance, or at least from recovering the full amount that would otherwise be due.

R. Clipston Sturgis, president, American Institute of Architects: In view of the fact that so many of our fires are due to culpable negligence, and that the only way to bring this home is to make the guilty suffer, I believe most strongly in having authority to fix legal responsibility for the cost of fires due to carelessness or neglect. I believe that in connection with this there should be authority to condemn buildings that are a dangerous fire risk, and to order remedied conditions that involve similar risk.

Charles E. Meek, president, National Association of Credit Men: It is welcome news to hear that the National Fire Protection Association has drafted a bill which will be introduced into the legislature in every State, and which, if enacted, will penalize the individual whose carelessenss has damaged the property of others. The members of the National Association of Credit Men can, as individuals, aid materially in re-

ducing the fire loss and at the same time set a good example to their neighbors through personally inspecting their places of business and their homes at regular intervals, for the purpose of ascertaining whether the ordinary precautions against fire are being exercised.

J. C. McDonnell, chief, Bureau of Fire Prevention and Public Safety, Chicago: I am heartily in favor of a measure to fix legal personal responsibility for fires due to carelessness or neglect. I should like to see such a law enacted by the United States Congress.

George W. Lattimer, chairman, committee on legislation, National Wholesale Druggists' Association: A community has a right to some protection from a negligent citizen, and the only course, in my mind, is to place a penalty upon him, if his carelessness causes loss to his neighbors.

Oscar B. McGlasson, president, National Wholesale Grocers' Association: I am firmly of the opinion that if the assured were made legally responsible for damage to adjoining property on account of fire originating within their premises, due to carelessness and neglect, the loss in the United States would be reduced anywhere from one-third to one-half within twelve months, and as a result rates would come tumbling down in the same proportion.

Walter H. Bennett, fire marshal, Illinois: Personal and individual responsibility for damage by fire is a revolutionary doctrine only, in that it applies to such injury a well known and recognized important principle of law. It is but an amplification of the doctrine of negligence, which is applied to many acts, both of omission and commission, of a person who has relations with, and duties to, another. I believe this wise and helpful legislation rigidly and honestly enforced will be the greatest and most successful agency for fire prevention that can be inaugurated in this country.

The pamphlet has statistics of the fire loss in the United States and Canada, 1877-1914. The fire loss in 1914 was estimated at $235,591,350, or nearly $11,000,000 more than the total for 1913. The fire loss in 1914 was the largest in the history of the country with three exceptions, namely: 1908, the year of the conflagration in Chelsea and three other conflagrations; 1906, the year of the San Francisco conflagration; 1904, the year of the Baltimore conflagration. The fire loss by the conflagration in Salem in 1914 was about $13,000,000.

## ACTUARIAL BUREAU OF ARKANSAS.

The proposition to abolish the Arkansas Actuarial Bureau aroused considerable opposition at the session of the legislature, and the Arkansas Association of Local Fire Insurance Agents took advantage of the opportunity to explain the work of the bureau.

In a pamphlet addressed to the members of the legislature, H. B. Caldwell, one of the vice-presidents of the agents' association, said: "Under the schedules of the Arkansas Actuarial Bureau every man pays exactly the same rate on the same kind of property, be he great or small, rich or poor, patrician or plebian—and this is exactly as it should be.

"It appears to me that the facts and statistics show beyond question or dispute that the law that created the Arkansas Actuarial Bureau is, and will continue to be, one of the very best laws ever enacted by the general assembly of this or of any other State, resulting in the greatest good to the greatest number of citizens.

"The work of the able experts of the Arkansas Actuarial Bureau, assisted by the better element of Arkansas local agents, will demonstrate to all fair-minded men that the law not only can but has and will continue to accomplish to the very fullest extent the results intended by the framers of the law—the placing of the insurance profession on a much higher plane, the general betterment of conditions for all the people by the reduction of fire waste, and a chance, by such improved conditions, for the companies to recoup the enormous losses which they have steadily sustained for so many years in Arkansas, and yet be able to give to the people of the State the very lowest rates of insurance that they have ever had."

# CODE ON PROJECTIONS OF BUILDINGS

THE proposed new article of the Building Code on Projections Beyond the Building Line embodies the present practice in the Borough of Manhattan with respect to encroachments. The other boroughs have substantially adopted the Manhattan practice, though in the Borough of The Bronx it seems to be felt that the permissible encroachments are too liberal.

The ordinance specifies in detail what projections outside of the building line are to be permitted and under what conditions. It permits the continuance of existing encroachments until the space occupied by them is required for public use, when the Board of Aldermen or the Board of Estimate may order the removal of such encroachments. It provides also that any permission to construct outside the building line is to be revocable.

The ordinance contemplates also changes in other parts of the code or ordinances to make the different provisions with respect to projections consistent. The projections that are referred to definitely in the ordinance are as follows:

Areas are prohibited outside the building line unless covered by a grating or incombustible material of sufficient strength to carry the pedestrian traffic.

When so covered they are permitted to project as heretofore 1/15 of the width of the street, but not more than five feet.

Courtyards inclosed with railings or balustrades are not permitted to come outside the building line except on certain park streets.

Steps are limited to a projection of 2½ per cent of the width of the street, and not more than 18 inches, provided they are placed between ornamental columns, pilasters or cheek pieces at least 3 feet high.

The maximum width of such steps is limited to 20 per cent of the actual street frontage when such frontage is 25 feet or more, and to 5 feet when such frontage is less than 25 feet. An exception is made for certain streets under the jurisdiction of the Park Department.

Ornamental projections, such as columns, pilasters, are limited to 2½ per cent of the width of the street and not more than 2 feet in any case.

Balconies of an ornamental character may project not more than 5 per cent of the width of the street, with a maximum projection of 3 feet, but no balcony shall be less than 10 feet above the sidewalk.

Mouldings, belt courses, cornices, lintels and similar projections of a decorative character are limited to 1¼ per cent of the width of the street and 10 inches as a maximum; except that the main cornice at or near the top of any building more than 20 feet high may project 5 per cent of the width of the street with a maximum limit of 5 feet.

Base courses not exceeding 5 feet in height above the sidewalk shall not project beyond the building line more than 1¼ per cent of the width of the street and not more than 10 inches.

Rustications and quoins are limited to 4 inches.

Show windows and bay windows are not permitted to extend beyond the building line at any point within 10 feet of the sidewalk. All such limitations that are fixed by the bay window ordinance have been continued for bay windows and show windows above the first story.

The limitations now fixed for awnings and marquises by the orders of the borough president are made to apply generally.

Fire escapes that do not continue to the street level may project 4 feet beyond the building line.

The present requirements as to storm doors and vaults are continued.

It is proposed that fresh air inlets and outside hose connections for standpipes and other fire equipment shall be kept within the building line in recesses in the building, except that where there is an ornamental column or cheek piece for the stair they may be placed in the angle formed with the front wall, provided they do not come out more than 18 inches from either side of such angle.

## AUTOMATIC GUARD ON HOLLOW MORTISER.

The mechanic who is delegated to equip the machines of a shop with safeguards must be ingenious to meet the problems which are presented constantly

Courtesy of the American Car and Foundry Company.

HOLLOW MORTISER.

**The automatic guard over the tool works in conjunction with a lever that operates the tool.**

to him. That he rises to the occasion, in most instances, is shown by the quality of the work done.

The qualification was evidenced in equipping a hollow mortiser with a guard at the point of the application of the tool. The operation of the guard is controlled by the lever, which also controls the tool.

To complete the job the driving belt is guarded in an approved manner. Taken as a whole, the guarding reflects credit on the man who designed it and on the shop that authorized the installation.

## SAFETY COMING AND GOING.

The first thing to greet the employe coming to work in the morning in this instance is the illuminated sign over the gate, as shown in the picture. The admonition to keep your eyes open, use your head and look out for the other fellow, if followed, will eliminate the larger part of the avoidable accidents. The warning sign is illuminated, first to greet the men on their way into the yards in the morning, also the last thing they see when leaving for home at night.

It will require numerous signs, such as the above, and other means of education to overcome the careless habits formed during the past years when only a few paid any attention to safety habits or how to prevent accidents. The em-

Courtesy of the Inland Steel Company.

**Illuminated Sign at Gate.**

ployer who believes "it pays to advertise" safety and who carries the belief into practice is sure to reap the result of lessened accident frequency and consequent higher efficiency of his organization.

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A steel chain should be annealed, but not an iron one.—*W. E. Firth.*

# EDITORIAL

**Correct Classification of Accidents.**

A STUDY of numerous accidents attributed to specific causes has brought out the question as to whether or not the causes assigned are the proper ones. We note, for instance, that a great number of accidents reported as having occurred on machines or appliances, if studied in detail, are found to have been superinduced by other causes, the removal of which would in many cases have prevented the accidents even though the direct machine causes were present. This applies particularly to slipping hazards and bad light.

This is not an argument that the direct machine hazard should not be eliminated promptly and properly in every shop, but is designed to emphasize that it is as essential that the floors surrounding the machinery be kept in such condition that the workman under all conditions may have the greatest opportunity to retain his equilibrium and that it is equally essential that sufficient light be provided to prevent the workman from getting dangerously near the operating parts of the machine, which parts cannot be guarded practically.

As an instance in point, it is noted that an acid accident, as reported in a plant, was classified simply under the heading "Burned by acid," whereas the real facts in the case were: The man was carrying a pail of acid. He slipped on a greasy floor, spilling the contents of the pail over himself, causing death. It is admitted that the direct cause of accident in this case was acid burning, but the predisposing cause was certainly a slippery floor, and whereas a suggestion for a safe container of the acid would naturally be in order where such dangerous fluids are handled, still it is just as essential that non-slipping surfaces be provided on the floors where the men are obliged to carry such dangerous fluids.

Another case may be cited—an accident caused through a person slipping while getting on or off an elevator at a floor landing. The accident is usually classified as an elevator accident; "injured getting on or off elevator" is the usual report, where again as a matter of fact the predisposing and inciting cause might have been slippery or poorly lighted landings.

Results in accident prevention are obtained largely in direct ratio to a proper determination of the causes of accidents, which is therefore a question that demands the most careful consideration by all safety engineers and statisticians.

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**The Common Hazard.**

THE REPORT on sidewalk and street hazards by the American Museum of Safety to the mayor's safety committee, reprinted in large part in this issue, is of vital interest not only to those engaged actively in the promotion of safety, but to architects and engineers, property owners and city officials, who should heed the suggestions and recommendations.

The astounding fact that falls on stairs and sidewalks, more than one-half of which were caused by slipping, killed more persons in New York City than fires, subway, elevated and surface cars,

combined, calls for prompt and energetic measures to relieve the conditions.

The spectacular death receives recognition. When one or more persons lose their lives in a fire the newspapers herald the fact in big headlines. Let us not overlook the common, every-day hazard that is continually taking its toll of human life in far greater numbers.

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**It Floats Free in the Empyrean.**

SAFETY ENGINEERING accepts as truth the adage that "imitation is the sincerest form of flattery." When this magazine designed and published its now famous emblem, "Safety Eclipsing Danger," many requests were received from manufacturers and commercial bodies for permission to use the design as an emblem truly expressive of the principle of safety work. SAFETY ENGINEERING gladly granted that privilege and refrained from copyrighting the design as a trademark because it desired to see the symbol used extensively. Numerous institutions adopted it, indicating that our policy of courtesy was appreciated.

The latest recruit in the company of numerous users of the sign is *The Dodge Idea*, of Mishawaka, Ind. On the front cover of its March edition the familiar, superimposed discs, Safety and Danger, are displayed as the two hemispheres, the western hemisphere (America) in green and the eastern hemisphere (war-torn Europe) in red. In green, above the eclipsing discs, are the words "Universal Peace"; below, in bold red letters, are the words "Stop the War!"

SAFETY ENGINEERING admires the adaptation and approves heartily the idea of universal peace. Our felicitations are wigwagged to Mishawaka for the suggestion, so artistically made, that the safety of peace should soon eclipse the danger and horror of war. But SAFETY ENGINEERING'S symbol, "Safety Eclipsing Danger," being a free citizen of the world and the friend of all mankind, must rend asunder the unhappy Mishawaka "Copyright by Kenyon Mix!" The exclamation point is ours. The operation of disruption is performed in a friendly and courteous spirit, and doubtless Mr. Mix will be a gentle patient, for he will have no difficulty in recalling that "Safety Eclipsing Danger" is a design developed and published by SAFETY ENGINEERING, and is a gift to the world. It cannot with propriety be copyrighted by anybody in any guise or disguise. It is the national and international Banner of Safety. It floats free in the Empyrean, and long may it wave!

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**Carelessness and Thoughtlessness.**

THROUGH one of the exasperating errors in the publishing business the sidehead of an editorial article in SAFETY ENGINEERING for March was "Duplication and Efficiency" instead of "Duplication and Inefficiency."

The words of the erroneous sidehead passed before the keen and accurate eyes of compositor, proofreader and editor. Nobody noticed the use of the wrong word. Therein was an example of the carelessness and thoughtlessness that the "Safety First" movement has noted as responsible for industrial accidents that have maimed and killed thousands of workers. We take the lesson to be: THINK FOR SAFETY.

# *Safety Through Good Ventilating Systems*

*By Edward T. Walsh, M. E.*

IN THE March issue of SAFETY ENGINEERING the writer described the causes of the vitiation of air in factories and workshops and defined the necessity for adequate ventilating systems to keep air reasonably pure. The article ended by directing attention to the method of removing dust and injurious fumes by means of electricity, now being developed and put into practical use.

Another method of ventilation and dust removal which is successful and has become deservedly popular is the method called "air conditioning." It is the name given to the process of treating air for ventilating purposes so that any desired condition of temperature, humidity and purity may be obtained. It is suited more particularly to general ventilation. Briefly, the method consists of taking the air from outdoors, washing it, to remove the dust; cooling it, to remove the moisture it contains; heating it and, in some cases by the addition of water, humidifying it to the degree that is desired. The method is used in large textile mills, bakeries, printshops, candy factories, paper finishing plants, tobacco factories, potteries, schools and mattress making factories.

A typical installation of an air conditioning apparatus is shown in Fig. 1.

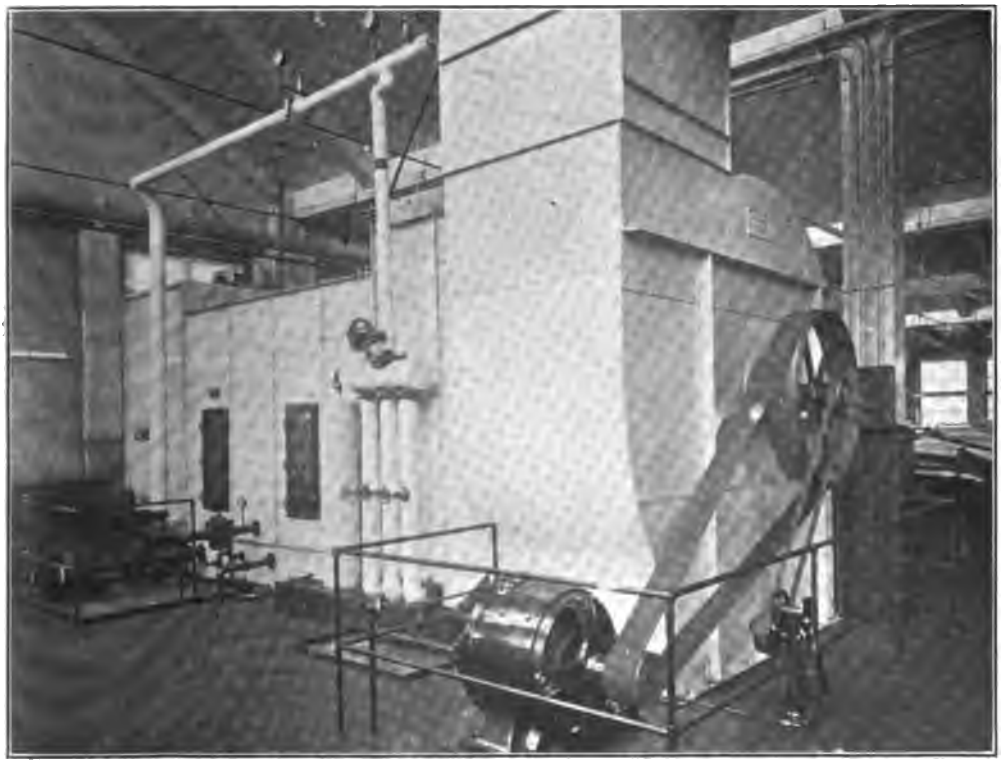

**Fig. 1. Typical Installation of an Air Conditioning Plant.**

**Fig. 2. Arrangement of Ducts in a Large Factory of a Hat Manufacturing Company.**

The illustration shows the apparatus in the John B. Stetson Company's plant at Philadelphia. The fresh air connection, taking the air from outdoors, is shown, also the air washer and humidifier, the reheating coils and the centrifugal fans for blowing the air into the mill. The arrangement of ducts for conveying air throughout the mill is shown in Fig. 2. The ducts are of galvanized iron.

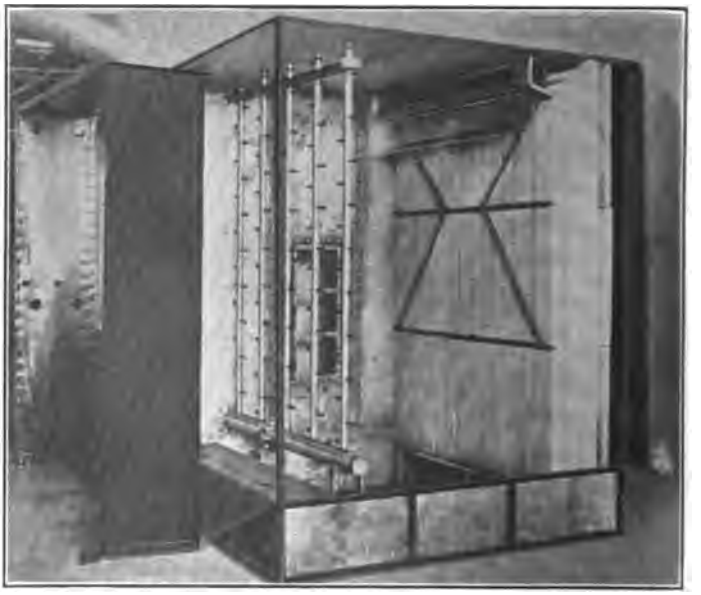

**Fig. 3. Interior of an Air Washer.**

To show the apparatus in detail and the principles upon which it operates the Figs. 3 to 9, inclusive, are introduced. Fig. 3 shows a Carrier air washer, with the side casing removed. The settling tank, in which the dirt, removed from the air, is collected, is at the bottom. The tank is fairly large to allow the water to remain at rest long enough to precipitate the dust. A supply of fresh water is added to take the place of that lost by evaporation, this supply being controlled by an automatic float valve.

The water is removed from the settling tank through a suction strainer (Fig. 4), in which it is filtered, and passes

Fig. 4. Suction Strainer.

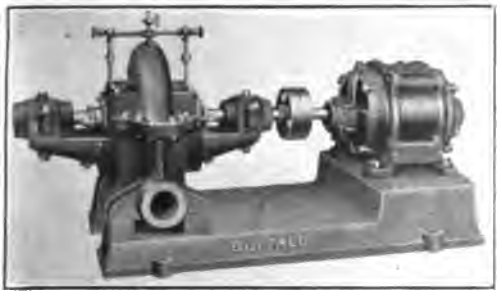

Fig. 5. Double Suction Centrifugal Pump.

Fig. 6. Detail of Water Nozzle.

to the centrifugal pump (Fig. 5). The pump forces the water at a pressure of 17 to 45 pounds into the header and standpipes and through the nozzles in the form of a spray. The incoming air must pass through the spray. The small particles of dust come in contact with, and adhere to, the small globules of water. One globule of water will collect a great many particles of dust before it strikes the eliminator plates, which catch these minute drops of water, return them with the dust to the settling tank, and allow the cleansed, humidified and cooled air to pass on into the room or building.

The nozzle, a simple device, is shown in Fig. 6, and the eliminator plates are shown in Fig. 7. The plates are about one inch apart and the air, striking against them, is separated from the water. The settling tank is drained periodically of all of the water and its deposit of dirt removed.

Fig. 8 shows the water as it passes from the nozzles in the form of spray. The air must pass through this spray on its way into the building.

In winter, when the air is very dry because of its low temperature, all buildings need artificial humidification, and at such times it is necessary to heat the water used in the washer in order to get the evaporation of moisture required to maintain the desired humidity. By condensing steam in an ejector and mixing it with the circulating water the heat necessary is obtained easily.

The machines can be controlled so that

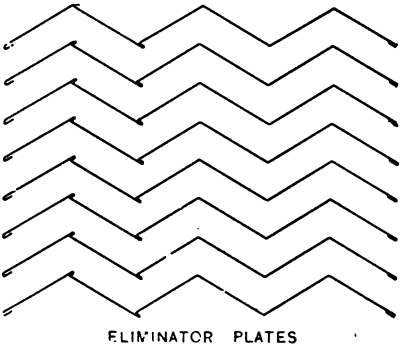


Fig. 7. Detail of Eliminator Plate.

**Fig. 8. Spray from Nozzles Through Which Air Must Pass.**

every cubic foot of the air that enters the building will carry a similar number of grains of moisture. The air that leaves the washer and humidifier is saturated completely; to lower the humidity, it is only necessary to raise the temperature.

Where extremely accurate regulation of humidity is required an automatic humidity controlling device is used. The instrument, shown in Fig. 9, depends upon the relative temperatures of the wet and dry bulb thermometers. It is used to turn on and off the heating coils as required and to control the quantity of air supplied to the building in order to maintain the required relative humidity.

The benefits that accrue from the installation of a proper ventilating equipment are so important, from an economic as well as from an hygienic standpoint, that it is surprising there are any factories, workshops or other large buildings without it.

The proper conditioning of the air in department stores will keep goods fresh and more salable for a longer time, prevent silks and other delicate fabrics from drying out and having a harsh feel. It makes the store more comfortable for customers; it makes the sales persons more efficient, because they are pleasant and even-tempered.

In textile mills, manufacturing cottons, woolens or silks, the quality of the products depend on proper atmospheric conditions. With the proper degree of humidity the fibres are more pliable, conforming more readily to the operations of spinning, drawing and weaving. A proper degree of humidity eliminates

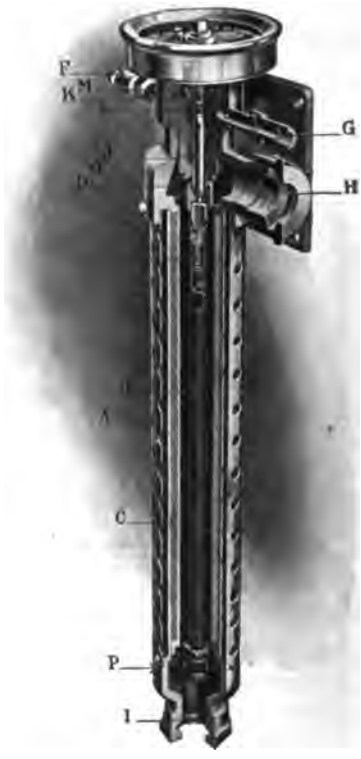


**Fig. 9. Detail of Humidity Controlling Device.**

**Fig. 10. Interior View of Textile Mill, Showing Ducts on Sidewalls.**

**Fig. 11. Interior View of Weave Shed of Textile Mill.**

**Fig. 12. Dough Room in Bakery. (Ventilating ducts shown.)**

static electricity, with the result that the fibres cling together, enabling twisting into stronger and better threads. The adjustments of machines do not have to be changed so frequently, all of which tend to increase production.

The importance of humidification in the textile field was recognized long ago and various methods of providing the moisture were adopted; steam pots were used or local humidifiers, which sprayed the moisture into the air. Either of the makeshifts served the purpose during the winter, because the heat generated by the machines was dissipated through the walls, roofs, etc., and conditions were fairly good, except for the excessive dust in the air due to no ventilation. In summer time, because there was no means of controlling the temperature, the mentioned methods of humidity control failed. If the windows were opened too much air would enter and the humidity would be lost; with the windows closed, the temperature would rise, thus decreasing the relative humidity. The humidifiers, running constantly, could not supply the moisture fast enough to keep up with the rise in temperature, and the temperature and humidity would become unbearable. Windows were opened, with the result that the humidity was lost. Dust in the air increased the discomfort of the employes.

The heat generated by the machinery in a textile mill is often great enough to cause the temperature inside to be 30 to 40 degrees higher than outdoors, if the windows be kept closed, and 20 degrees warmer, if the windows be kept open. Contrast the conditions with those in a mill where the air is conditioned properly, and furnished in sufficient quantities to remove the heat from the workers and machines and the temperature inside is kept from 5 to 15 degrees cooler than outdoors even on an extremely hot day. The production of the mill is increased because of the good running conditions for the machines and fibre, and the comfort of the help makes them more efficient.

**Fig. 13. Press Room in Printing Shop. (Note the ventilating ducts.)**

A mill equipped ideally is four stories in height, 150 feet in width and 340 feet in length. The ventilating or air conditioning equipment is in a one-story building. Approximately half a million cubic feet of air is washed, cooled, moistened properly and delivered into the mill through horizontal ducts to vertical flues between the windows which extend outward and distribute the air through diffusers.

Fig. 10 shows the ground story of the mill. The ducts for distributing the air may be seen at the side walls and on the ceiling. The heater coils are in the air outlets for each story, which enables one story to be cooled while another is being heated. The heat from the machinery in some cases makes it necessary to cool the mill in cold weather, and in other cases rooms that contain small numbers of machines may require considerable heating.

The interior of the weave shed of the mill is shown in Fig. 11. The distributing duct is on the ceiling of the basement, with openings in the floor through which the distributing flues enter the room, as shown. A deflector or diffuser is at the top of the vertical duct to distribute the air in all directions.

In bakeries the dough room should be kept at the proper temperature to have the yeast bacteria germinate; at the same time it is necessary that the proper degree of humidity be maintained to prevent "case hardening" of the dough, thereby preventing the gases from being given off as generated. Under the proper conditions the dough rises with uniformity as to time and quality, increasing the production about 15 loaves for each barrel of flour. A dough room equipped with an air conditioning plant is shown in Fig. 12.

Candy plants should be ventilated

**Fig. 14. Interior of Tobacco Stemmery. (Note the ventilating ducts.)**

thoroughly to remove the odors of the product as well as the impure air due to a great number of operatives. These have been successfully ventilated and conditions made comfortable by the installation of air washing equipment.

In printshops, where color printing is done and considerable time elapses between impressions, it is desirable that a uniform temperature and degree of humidity be maintained in order to prevent the paper from changing its size and destroying the register. Fig. 13 shows a printing plant equipped with an air conditioning plant which permitted it to run continuously during a time when no other multicolor printing shop was able to operate on account of the extreme humidity in the atmosphere.

Work in the manufacture of tobacco must be under exacting conditions in regard to temperature and humidity because of the fragile nature of the leaf. In some plants that operate under dry and hot conditions the dust becomes so bad that one not accustomed to the conditions can remain in the room only a short time without being affected. Previous to the installation of the proper equipment in the stemmery, shown in Fig. 14, the dust was so thick that it would have been impossible to have a photograph show clearly the girl at the fourth machine from the camera. Every girl worked with a handkerchief over her nose and mouth, and the handkerchief would be covered with tobacco dust that was screened from the air that the girls were breathing.

Humidity makes the tobacco leaf more pliable, and because of the moisture most of the dust falls to the floor; that which does not is removed by the rapid air changes. The photograph from which the illustration was made was taken during working hours, showing the conditions.

Several years ago the Ford Motor Company built an administration building and equipped it with a modern air

**Fig. 15. Dirt Removed from Mattress Factory in One Work Day.**

conditioning plant which distributed fresh, moistened and cooled air throughout the offices. Henry Ford noticed that on the hottest days his office was about 15 degrees cooler than the outside temperature. Later all of his machine shops were equipped with washing, cooling and ventilating equipment.

The quantity of dust and dirt that is to be found sometimes in one factory is shown in Figure 15. It was removed from the air of the room in one working day. It consists of cotton, lint and dust. The screen, shown behind the pails in Fig. 15, caught the dust between the settling and suction chambers. The air was re-circulated during the winter in order to save heat. The owners of the factory said that there was no question that their employes had increased in efficiency, and they were now enabled to work six days a week. Previously it was unusual for a man to work a full month without lost time on account of illness.

Fig. 16 shows a week's dirt taken from an air washer in one of the public schools in Brooklyn, N. Y. All of the air for ventilating the building was taken from an enclosed court that had a concrete pavement. No air was taken from the street; it had to come over the tops of the buildings into the court. The plant operated only from 9 a. m. to 4 p. m., and probably not more than half of the dirt in the settling chamber was caught, because the finer particles were carried off by the water as it was drained away to the sewer.

In considering the problem of removing objectionable steam from an enclosed space, it must be remembered that cold air causes condensation and that with air saturated fully with moisture, even if mixed with ten times its volume of air from outside at half its temperature, con-

**Fig. 16. Dirt Taken from Brooklyn Public School in One Week.**

densation will occur, and it will always do so regardless of the dilution. If the incoming air be warmed, even to a moderate extent above that in the room, the condensation will be prevented, and the ventilation will serve two purposes, make conditions more comfortable and prevent condensation. If it is necessary only to prevent condensation, without regard to the comfort of possible occupants, provide more heat.

In dye rooms, or houses or buildings occupied for similar purposes, where steam is used plentifully, condensation can be avoided by removing the moisture from the incoming air, then heating and distributing it in the affected rooms.

It must be understood that it is necessary that exterior walls and roofs be insulated so that the cooler outdoor temperature is not transmitted through them, or the inside saturated atmosphere be prevented from coming in contact with the walls and roof by means of a film of heated air, passing up in front of them.

The cases cited are only a few of the many that could be brought forward to prove the grave necessity for, and the benefits for employer and operatives derived from, safeguarding human life and health by proper air conditioning and ventilation.

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This is the second and last of two articles on this subject by Mr. Walsh.

## PICTORIAL BULLETINS.

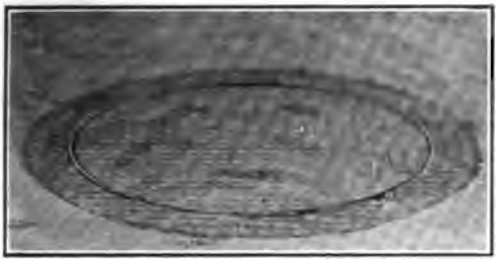
The National Safety Council is planning the preparation of public safety pictorial bulletins, to be distributed by local councils, railroads, public service companies and others. It asks for suggestions for the bulletins, including interesting photographs that show how accidents occur in public places.

## KEEP FROM UNDER!

While a workman was standing under a load of wood in a sling, the load fell and crushed him. Why? Because he did not "play safe" and "keep from under." The brakes on the derrick were frosty and they slipped. Whether inside or outside the mill the safe way is to keep from under loads of a derrick or a crane!

# *Sidewalk and Street Accidents in New York City*

IN THE Borough of Manhattan, New York City, in 1912 and 1913, a record was for 327 death cases due to falls on sidewalks and stairs. In 1914 the coroner's office recorded for the borough 68 death cases due to falls on sidewalks and 102 to falls on stairs. There is no record of permanent and minor disabilities, resulting from falls on sidewalks and stairs.



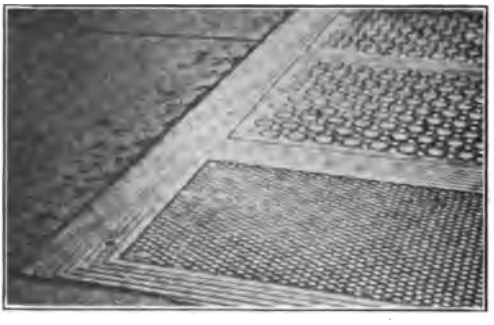
**Coal-hole cover, with safe slip-proof abrasive metal.**

Assuming the ratio of death cases to cases of total injuries to be about the same as in other classes of accidents, it has been estimated that the total number of injuries each year in the borough runs along something like 14,800 from falls on stairs and 10,670 from falls on sidewalks. Architects, engineers and property owners are responsible for the nature of the materials they use for surfaces on which people walk.

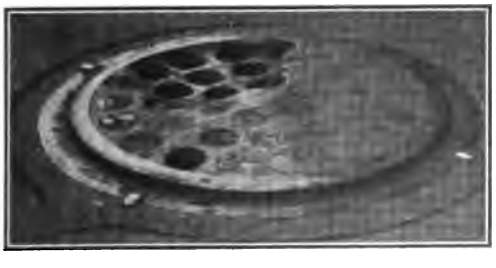
Compared with other hazards, it is to be noted that few, if any, are as serious as those of sidewalks and stairs. More than one-half of the cases of death due to falls on stairs and sidewalks were caused directly by slipping.

As a matter of fact falls on stairs and sidewalks in recent years have caused more cases of death in Manhattan than accidents to persons on subway, elevated and surface railways. In 1914, in Manhattan, surface cars killed 53 persons; subway, 12; elevated, 12; fires, 65, making a total of 142, compared with a total of 170 for falls on sidewalks and stairs in the period and district.

The record prompted the Central Committee on Street Traffic and Safety to study the subject of sidewalk and street accidents other than vehicular, and Chairman A. A. Anderson requested the American Museum of Safety to submit recommendations for consideration by the committee. The report on the study was submitted by Dr. W. H. Tolman, director of the American Museum of Safety, who expressed the opinion that casualties due to sidewalk hazards could be reduced to a great extent. The report had the foregoing statistics on sidewalk and street accidents, and the photographs for the accompanying illustrations, with one exception.



**Metal sidewalk vault light borders are usually dangerous slipping hazards.**



**Slippery and otherwise dangerous coal-hole covers cause more casualties than any other single public hazard.**

"Even a casual inspection of our sidewalks shows astonishingly hazardous conditions," the report said. "Slippery

Courtesy of G. O. Smith.

**Coal holes unguarded when unloading coal are sources of danger.**

surfaces, such as coal-hole covers, sidewalk and vault lights, curb edges and vent grates are hazards that are most common and productive of serious accidents. The glass surfaces of vault lights and the usual iron borders around them, if unprotected, are always danger-

Courtesy of G. O. Smith.

**Coal holes should be guarded while coal is being unloaded. The guard should be a part of the wagon's equipment.**

ous, but under certain weather conditions are a positive menace to the safety of pedestrians.

"Coal-hole and man-hole covers are extremely vicious hazards. A casualty insurance company received in one day reports of nine different accidents on one coal-hole cover. The condition in which fully 70 per cent of the covers are found is beyond excuse. Around the old Post-Office building, Park Row and Broadway, are upward of two dozen covers in the sidewalk that are in dangerous conditions. The 'East Side' has countless numbers of these hazards; they are numerous elsewhere.

"A woman, coming out of a store, slipped on the steel plate or glass vault lights in the sidewalk, struck her head on the stone sill and died soon afterward. Metal frames or borders around sidewalk lights are very common and exceedingly dangerous. All surfaces where people walk should be so constructed and maintained that slipping on them is impossible. Corrugations or

**Areaways without railings or guards are being eliminated in many places. The hazard is obvious.**

other irregularities of metallic surfaces do not make them slip-proof.

"The New York City Department of Docks and Ferries in the new terminal at St. George, Staten Island, used over a thousand feet of slip-proof drainage gratings and expansion joint cover plates to provide safe footing for the many people walking over the concourse. In this case the material used was cast iron with a wearing surface embodying alundum grit in such a way that it is absolutely slip-proof and extremely durable.

"Granolithic or cement surfaces where there is a grade or ramp are the sources of many accidents. Crosses or narrow strips of abrasive-metal, or other proven slip-proof material, should be required at

**Fire plugs, other obstructions and broken sidewalks are the sources of many accidents to pedestrians. Such conditions would not be permitted if jurisdiction and responsibility were defined clearly.**

such places. ...The same method should be used in making safer glass sidewalk light areas. Lead rings or crosses are not efficient. An abrasive metal guard, with the grit projecting sufficiently above the surface to give the necessary 'bite,' has been used extensively.

"Tripping and other hazards, as well as slipping hazards, are found on these sidewalks. Fire plugs, railings, steps and other obstructions are the causes of many painful accidents. The Siamese sprinkler connections for fire engines are usually placed in the sidewalks in a very dangerous manner, and they are particularly unpleasant things for the pedestrian to bump into.

**Siamese sprinkler connections are bad obstructions on sidewalks. Each should be in an alcove of a building wall or in a box flush with the curb.**

"Open cellar doors, without railings or other guards, are frequently met with and are especially dangerous. Stairs leading from almost the middle of a sidewalk up to the first floor or down to a basement should be absolutely prohibited; but they are to be found in large numbers, especially in the more crowded districts. Gratings and similar devices frequently have openings large enough to catch one's heels and cause a painful injury, or even a fatal fall.

"Sidewalk entrances to cellars seldom have suitable guards. Most often the doors are thrown back on the sidewalk. Sometimes they are open and stood up on edges or a flimsy rail is placed around. Neither expedient prevents people from falling in. Occasionally a good substantial guard around the opening, with a wire grating in it, is found.

**Concrete ramps or sidewalk inclines are made slip-proof by the use of abrasive metal crosses set in the surface.**

**A well-guarded sidewalk entrance to cellar.**

"In certain districts where much shipping or manufacturing is done there are many conditions that could be improved. Materials of all kinds are piled on sidewalks regardless of the hazards. Shipping platforms seem to be forgotten. The sidewalk serves the purpose and pedestrians must use the street.

**Unguarded and insufficiently guarded sidewalk entrances to cellars are danger spots.**

"While coal is being unloaded through a coal-hole in a sidewalk a guard should be placed around the hole. A similar guard should always be used around open man-holes. Each wagon should carry a guard as a part of its equipment. In New York probably less than 20 per cent of open coal-holes are guarded.

"The most dangerous of stair hazards is the inexcusably bad condition of the treads. In many cases they do not look hazardous; but some of the most ornate stairs are among the most dangerous. The many accidents have a definite underlying cause.

"It has been proven that a smooth steel or brass nosing strip is dangerous. For instance, from a safety standpoint, there is no objection to rubber on a stair tread, if it is carried down over the nosing edge; but there is a decided hazard in the brass or steel nosing strip frequently used in connection with such treads. When the inevitable slip on

**The edge of a step should never be of steel, brass or iron. It is the contact point of the foot when a person goes down stairs. Slips are fatal frequently.**

such a nosing occurs, as a person goes down stairs the foot slides forward and the front edge of the heel catches in the little offset formed by the rubber having worn faster than the metal nosing.

**A step with a smooth metal front or nosing edge and a series of heel-catching grooves parallel to that edge is a positive menace. The Pennsylvania Railroad Company does not permit the use of a tread with grooves more than 1 16-inch deep on stairs.**

**A person going down stairs is confused at times by being unable to distinguish which one of the lines extending in the same direction is the line of the edge of a step. There are other reasons why grooved stair treads are dangerous.**

As the heel catches, the foot is stopped; but the forward motion of the upper part of the body continues, so that the person is thrown forward, usually striking on his head. This is the reason so many stair accidents result fatally by concussion of the brain. Cast iron and steel treads are unsafe because they are slippery.

"Many stair treads have a series of grooves back of and parallel to a slippery metal contact along the nosing edge. On such treads people not only slip on the edge, catch their heels and sometimes their toes with fatal results, but also find it difficult when going down to distinguish which one of the lines, all running in the same direction, is the line of the edge of a step. If the light is bad or eyesight poor this hazard is very great.

"Action should be taken at once to reduce and, where possible, to eliminate these dangerous conditions. While it is easy to point out hazards, it is extremely difficult to get the proper repairs made. There seems to be no definite jurisdiction in such matters. Requisite safe construction of sidewalks and appurtenances should be insured by definite rulings and ordinances, and jurisdiction for such matters should be defined clearly. As a revision of the building code of New York City is under way, these matters might be considered in connection with it."

**The edge of a step should be slip-proof along its entire length, because the entire weight of a person is placed momentarily on it.**

**Many injuries are caused by slipping on pipes at curbs along the lines of subway work.**

COMMENTS BY "SAFETY ENGINEERING."

Extremely dangerous hazards, not mentioned in the report, are along the lines of the work for subway railroads where the iron gas pipes are curved at corners for the extension of main lines to cross streets. In a short time the pipe surfaces at the corners are worn smooth by the constant treading of people, creating a new hazard in the streets of New York.

It is necessary to bring the gas pipes to the surface along the lines of work

and connect them to underground pipes in cross streets. Subway work could not be carried on without bringing the gas pipes to the surface, but it is possible to reduce the hazard of slippery pipes at corners by covering them with slip-proof treads.

Where the pipes at corners have been above, or have not been close to, the curbing the subway construction companies have filled the spaces with wood, cement or asphalt, eliminating to some extent the danger of tripping and slipping, but nothing has been done to reduce the hazard of slippery surfaces.

## USE OF COUNCIL'S EMBLEM.

Many requests have been received at the headquarters of the National Safety Council from members desiring to make special use of the council's emblem on stationery, advertising literature, safety posters, etc. The executive committee of the council passed a resolution to the following effect:

That members of the National Safety Council be permitted to use the emblem of the council upon letter heads, advertising literature, and other printed forms, provided the words "Member—National Safety Council" appear as a part of the emblem, and as indicated in the reproduction of the emblem on the council's letter paper, or in some similar form.

That the headquarters of the National Safety Council will be glad to make arrangements to supply the cuts of the emblem at cost.

That in making an announcement of this action, all members and others be cautioned that manufacturers of safety devices, or other products, using the emblem in the manner described as a part of their advertising literature, must not interpret the use of the emblem to mean an approval of such devices or products by the National Safety Council or its executive committee.

The National Safety Council wishes to make its emblem a national symbol for safety and hopes that members will co-operate to accomplish this. Cuts of the emblem may be secured from the secretary's office at 30 cents each, and should be printed in green.

## INDUSTRIAL HYGIENE.

In order to systematize and develop the work of the Department of Health, New York City, in occupational diseases and in the sanitation of workshops and other places of employment, the commissioner has directed the formation of a new division which, under the title of Division of Industrial Hygiene, will form a part of the Bureau of Infectious Diseases. Dr. Louis I. Harris has been designated chief of the new division.

In the preparation of a programme, the department is to be assisted by Prof. W. Gilman Thompson, of Cornell University Medical College, an authoritative medical investigator and writer in the field of occupational diseases, who has consented to join the advisory council of the department, and has been named as chairman of a committee on industrial hygiene. The following tentative programme has been submitted by Dr. Thompson for consideration:

A general "industrial survey" comprising a statement of the number of employes in the city in extra-hazardous occupations, and a general statement as to where the most unhygienic plants under these industries are situated.

An intensive study of the conditions of work and the physical condition of the workers in, say, half a dozen of the most hazardous industries in the city.

Arrangements with certain dispensaries to open special occupational disease clinics to which all sufferers from occupational ills could be referred.

All observations should be checked with corresponding data as to home conditions, else conclusions may be assailed as incomplete. For example, tuberculosis among garment workers may be wholly due to home conditions and the workshop may be exceptionally hygienic. This could, in part, be done by co-operation with the Tenement House Department, although social service workers are the proper persons to obtain such data.

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When an employe, familiar with the operation of a certain machine, is injured or disabled seriously, it becomes necessary for the company to educate another man to occupy his position.—*Geo. A. Cowee.*

# AN ECONOMIC REVOLUTION

*By H. Jere Aldrich.*

IN the United States, in the year just passed, it is roughly estimated that 35,000 workers were killed and 2,000,000 others injured by accidents that could have been averted, to say nothing of 3,000,000 persons incapacitated temporarily by sickness due to occupational diseases. Thus, even at a conservative estimate, it may be stated that at least 15,000,000 persons, or nearly one-sixth of our population, are affected by a waste, 50 per cent to 75 per cent of which could have been eliminated. That is why the present nation-wide effort to protect the workingmen of the land is said to be one of the most important economic reforms of late years. This effort finds expression through what is both officially and popularly known as the "Safety First" crusade and marks the foreword of a new conception—the intrinsic value of human life.

Events have proven that any revolution of ideas, customs or beliefs, or any undertaking that tends to exert a permanent influence upon the doings of men, in order to be successful, must be waged against a people who, in regard to the reform attempted, may be said to be in a receptive state of mind. In the United States the mind of the industrial world is and has been receptive for a long time; the appalling waste of life and limb in occupations has held the attention of men for years, but with no appreciable results. Therefore, the success of this economic reform was assured even before it was fairly under way, because it started in an open field when the conditions were favorable.

The need of more attention to the subject of protection to life has existed, as stated, for many years. It is hard to say just when the first steps were taken in an organized way, although ever since the invention of steam power, the subsequent building of machinery and the development of industry have been carried on in a manner that has been more or less influenced by a desire to endanger life and limb as little as possible. Some authorities place the beginning as far back as the time of LaSalle, a famous social reformer in Germany; and they think they see, in his notion that government should assume the function of protection to individuals against misfortune, the germ of an organized movement in favor of legislation to remove the causes of accidental injuries. But, strictly speaking, this doctrine, as it were, was promulgated with a desire to provide against destitution as a result of accidents rather than against accidents themselves; and, in order to accomplish the desired reform, which the Germans undertook to do in the course of time, they did not go to the immediate causes of occupational accidents and try to remove them, but endeavored to protect workmen and their families against misfortune by means of insurance. In other words, they began at the end, not at the beginning. Instead of getting ahead of the danger, they were simply keeping pace with it.

Accident prevention, however, on the other hand has been found by the legislatures to be a voluminous question and their attempts to define safety laws and the limits of their operation, while consistently productive of good results, have already filled whole statute books in some of the States and burdened administration with a heavy expense. In the first place, labor statutes encouraging the adoption of protective measures are enacted primarily from the standpoint of requiring employers to remove, as far as possible, the causes of accidental injuries. But even though the legislatures attempted to enforce by statute the adoption of a specific safety device for every kind of occupation where the mere possibility of an accident existed, an ideal condition of safety would not ensue necessarily, because the fact would still remain, and always will remain, that there is an element in industry which legislation cannot standardize, and that is human nature. No two natures, no two brains, are alike. Therefore, after all had been said and done by the legislatures and the employers, the whole question of

safety was left to the mercy of the employes themselves; or, largely speaking, to public opinion, which incidentally is the strongest social institution of which we have knowledge.

A more opportune thing could not have happened, for the result now shows that, with the help of a little advertising, public opinion has given to this effort at conservation a character that is national in its scope and even comparable to the European Renaissance, if not in point of significance, certainly in the intensity of feeling with which it has swept over the country. It can be likened to the Renaissance because, as the Europeans of that time became imbued with a desire for learning, so have the industrial workers of today absorbed the principles of this great movement with a spirit of enthusiastic co-operation. At the same time, it must be said that this was not a project born of cool calculation and launched with prepense aforethought, for no one ever dreamed of its prolific tendencies. Like all great reforms, the original desires that led to its creation merely exemplified the existence of a greater and more trying need. Men did not foresee the gigantic possibilities of its unused force until the thoughts which impelled it forward were swelled to continental proportions and burst forth in one overwhelming answer to the crying need of a nation—"Safety First"!

The widespread effect of this campaign for safety is, of course, its most noteworthy feature, but it has particular significance for us in the relation it bears to insurance. It was insurance that gave to the movement its first impetus and placed it on the plane of an undeveloped resource in commercial circles. Mr. John T. Stone, president of the Maryland Casualty Company, when speaking recently of the contribution of the insurance world toward the promotion of the "Safety First" idea, said: "Let it be borne in mind, always, that the insurance companies have contributed more in money, brains and time toward the accomplishment of this great reform, and are pledged to a more intelligently sustained prosecution of this work, than any other single agency in America today."

The manner in which the insurance business played so important a part in the development of the "Safety First" reform is interesting. Briefly, it is as follows: When compensation insurance was in its infancy, the rates that were charged were a source of frequent disputes and constant bickering between the insurance carriers and the assured, the latter contending that they were higher, in proportion to the benefits received, than they should have been. Generally speaking, this was not true. But as the rates were uniform, as applied to the individual risks in each class of business, it often happened that the insurable risk of one company being less hazardous than that of another company in the same line of business, on account of more advanced methods of operation, one policyholder would be paying the same premium on the less hazardous risk as another policyholder paid on the more dangerous risk. Realizing the injustice of this situation and the need of giving to the individual risk the attention it deserved by reason of the adoption of safety devices, the insurance companies decided upon the plan of classifying and rating the great variety of businesses according to the manner in which they provided for the safety of their employes.

To that end, for many months, they devoted themselves to the work of inspecting mechanical, chemical and natural processes and of passing upon the accumulation of information regarding accident prevention, both at home and abroad. To that task they assigned the very highest skill and intelligence obtainable—men graduated from the best technical schools in the country and then trained for years in various forms of industrial activity. The results of their work are embodied in what is known as the Universal Analytic Schedule. This schedule is modified from time to time to meet the changing requirements of business and, with its supplements and revisions, is used now by all insurance carriers in inspecting and determining the rates to be charged for each individual risk.

This system of schedule rating is purely the product of the Workmen's Compensation Service Bureau, and is now conducted according to the findings of

the bureau. Statistics taken from the report of the bureau show that in twelve States, last year, inspections were made on more than 29,000 plants having 1,800,000 employes and involving a payroll of over $1,050,000,000. As a matter of fact, this tremendous work does not cover a space of one year, for the compensation laws of some of the States have not been in operation for that length of time, which makes the results all the more remarkable. It is now calculated that the reduction in premiums that has been effected by this system on the business insured has amounted to considerably over $2,000,000, which would seem to establish beyond a doubt the honesty of purpose of insurance companies and their desire to charge such rates only as the extent of the hazard of each individual risk may call for. The most commendable feature, however, is not alone that there was a comparative saving of over $2,000,000 in premiums to the policyholders; it is a fact, as has been properly stated, that this amount represents an actual reduction of the hazard, a veritable saving of $2,000,000 worth of lives and limbs.

In connection with this schedule rating system, the service bureau also conducts a department for the investigation and approval of safety devices. Since it had established for almost every industry a standard of safety that should be maintained, it was felt incumbent upon the bureau to assist in the maintenance of that standard as far as possible by giving sanction to practicable methods of operation. For this reason, provision was made for testing and either approving or rejecting protective devices so that now, when an automatic device or safety contrivance of any kind is offered for consideration, it is given a thorough test, and if found available for use in the capacity for which it is suggested, it is stamped with the official label of the bureau to signify that it has been approved for adoption. To makers and users of machinery the recommendations of this department are proving invaluable and, still further augmenting its service, is the work of the Underwriters' Laboratories. This is an institution with a quarter-million-dollar plant in Chicago, 80 branch offices in this country and Europe and with several hundred employes, most of whom are technical experts. Until recently the laboratories confined their operations to the field of fire prevention, in which, for seventeen years, the country received the benefit of their research and advice. Every conceivable article capable of exerting an influence upon the fire hazard is classified and rated according to its value, for which purpose over 40,000,000 labels were issued by the laboratories last year. We look to the laboratories to see that our fire hose, automatic sprinklers, electric switches, insulations, etc., are maintained at the highest point of efficiency and with the least danger to property. Now it has been announced that the laboratories have become affiliated with the service bureau for the purpose of extending their work to the accident prevention field and all indications point to the fact that their recommendations in that field will become a prominent factor in the advance of industrial safety.

Thus was the "Safety First" idea fostered and developed through the channels of insurance. By means of this inspection rating system, the diligence of an employer in providing for the safety of his employes is rewarded by better service. This operates in more ways than one—the hazard is reduced for the insurance company, the safety of employes is enhanced through the adoption of protective devices by the employer, and the employer profits directly by a material reduction in premium.

In other branches of activity, where the influence of the insurance inspector is not so keenly felt, the same undivided attention is given to the question of safety. This is particularly true of our transportation facilities, where the effects of new methods in the interest of the public are felt as never before in the operation of trains on our steam, electric and elevated railroads, as well as in the subways; and, figuratively speaking, there probably is not a locomotive whistle blown throughout the length and breadth of the land that does not carry with it an added significance. In fact, wherever possible, men have signified their endorsement of the safety movement in a

generous way. Supplementing and encouraging it all, and figuring prominently in its success, we find the work of the National Safety Council. The council stands for "Safety—Individual, Public and Industrial." It is an organization with its main office in Chicago and has nearly 3,000 active members. The present subscribers to its literature number over 1,000 employers of labor, representing many different forms of industrial activity and including the foremost railroading and manufacturing enterprises of the United States. The council was organized a little over a year ago with the prime consideration that accident prevention work should be centralized in order to produce continuous results. Previously movements in the interests of safety were more or less sporadic, springing up here and there throughout the country and, after enjoying the occasional support of magazines and newspapers, having sometimes a lasting but more often a brief existence. With the founding of this institution, however, backed and supervised by reputable men in the industrial world, an aspect of national importance was given to the efforts for safety which assured them recognition in every State.

With its propaganda thus recognized, the council did not for a moment enter a state of passive contentment to await calls for advice. It adopted an aggressive style of operation from the beginning. This aggression has resolved itself into two kinds, instructive and co-operative, but apparently the one has merged itself so imperceptibly into the other that the activities of the council have resolved themselves into a supreme effort with but one objective—co-operation, both universal and intelligent.

The council knows, and has endeavored to make the workmen understand, that all the mechanical protection that human ingenuity is capable of contriving cannot insure safety from accidents that are due to carelessness. The moral hazard, as it were, had to be reduced. Unless workmen could be induced to lend their intelligent co-operation, the effort of others would lose some of its value. As an illustration, it has been shown, in taking the average accident report of one plant, that 61.9 per cent, or almost two thirds of all the accidents, were due to the carelessness of the injured men themselves; that 10.7 per cent were caused by the carelessness of fellow workmen, thereby proving that on an average 72.6 per cent. or almost three-quarters of occupational accidents, are due to carelessness.

It remained, therefore, that people should be taught. Just as they learn that honesty is a virtue, so must they be made to realize that safety to life is a necessary element of every-day existence. Acting upon a right impulse, the National Safety Council, with all the resources at its disposal, set out upon the accomplishment of this great reform. It was confronted with a tremendous task, not the least part of which was the fact that the conditions of ordinary employment and the whims of the average workman would not admit of exhaustive methods, such, for example, as would call for attendance at a night school or education by correspondence. This meant that any method devised for the purpose of influencing the daily habits of workmen must necessarily be simple and easy to comprehend. In a busy plant workmen do not, as a rule, have time to peruse lengthy instructions. Many are incapable from a literary standpoint. Of those who have both the time and the ability, many are not impressed sufficiently with the value of precautionary hints to make it a point to be careful. On the other hand, it is a well known fact that the most primitive and, at the same time, the most lasting means whereby men acquire knowledge is observation. It was obvious, therefore, that the only methods at all likely to succeed depended upon the use of photographs and concise statements of warning and advice so that, like the pedagogue with the absent treatment, the council now sends out to its subscribers a weekly distribution of "Safety First" literature, made up of posters and significant illustrations printed in such a manner as to make a deep and lasting impression upon the minds of those who see them.

Naturally, the results are expected to indicate the value of these operations. In connection therewith, it probably is not out of place to submit herein some

figures taken from the reports sent in by various members of the council showing the work that has been accomplished along accident prevention lines. These companies report having brought about the following reductions by efficient safety work:

INDUSTRIES:

| | Per Cent. |
|---|---|
| Bucyrus Company | 46 |
| Cadillac Motor Company | 22 |
| Commonwealth Edison Company | 40 |
| (Public Service Company of Northern Illinois and Middle West Utilities Company, Chicago.) | |
| Eastman Kodak Company | 73 |
| Fairbanks-Morse Manufacturing Company | 72 |
| Harrison Bros. & Company, Inc. | 68 |
| Illinois Steel Company | 70 |
| Inland Steel Company | 55 |
| International Harvester Company | 68 |
| (Wisconsin Steel Company plant.) | |
| Jones & Laughlin Steel Company | 71 |
| A. J. Lindemann & Hoverson Company | 62 |
| Milwaukee Coke & Gas Company | 28 |
| Packard Motor Car Company | 67 |
| The Pullman Company | 70 |
| Raritan Copper Works | 22 |
| Rochester Railway & Light Company | 45 |
| Swift & Company | 48 |
| United States Steel Corporation | |
| 11,074 men saved from serious injury or death since 1906. | |

TRANSPORTATION:

| | |
|---|---|
| Atchison, Topeka & Santa Fe Railway System | 36 |
| Chicago, Burlington & Quincy R. R. Company | 31 |
| Chicago & North Western Ry. Company | 25 |
| Chicago, St. Paul, Minneapolis & Omaha Railway | 34 |
| Chicago Surface Lines | 75 |
| (Reduction in accidents to school children.) | |
| Delaware, Lackawanna & Western Railway | 38 |
| El Paso & Southwestern System | 42 |
| New York Central Lines | 30 |
| Northern Pacific Railway Company | 35 |
| Oregon Short Lines R. R. Company | 39 |
| The Pennsylvania R. R. Company | 30 |
| St. Louis & San Francisco R. R. | 38 |
| Southern Pacific Company | 52 |
| Union Pacific R. R. | 45 |

The foregoing figures, of course, are devoid of much inspiration. They merely represent the efficiency of good systems. It is only when the results are spoken of in physical terms of life and limb that they convey their real meaning.

This is essentially an age of production. Especially in America we have earned the reputation of being a death-defying race of people, heedless, in our greed for profit, of the welfare of ourselves and of our fellowmen. Therefore, it should be a source of considerable pride for Americans to be able to point to the fact that a humanitarian purpose can en-

gage, and does engage, the attention of the entire nation. And the "Safety First" crusade has not begun to attain its maximum effect, for many men have yet to see the wisdom of its workings and give to them their enthusiastic support.

Fortunately situated to further this great purpose, for the reasons mentioned, are insurance agents, who come in contact with almost every condition of commercial activity where safety suggestions may be put to every-day use. That insurance men are exerting a powerful influence, particularly in manual occupations, is exemplified by the fact that wherever their suggestions are put to the test the hazards of employment are improved and each succeeding month witnesses a material reduction in the number of occupational accidents. And their interest in this cause does not spring alone from a pecuniary desire, for such laudable service is making possible, to a large extent, the practical application of one of the greatest economic benefits that mankind has ever known, Compensation Insurance. Such service is the keynote of industrial progress. It proclaims a sharing in the social betterment of the workingmen of the world. It is a trumpet call to the highest fidelity, the keeping of our brothers. And, in the end, it can bring forth but one result; that is, Safety—First, Last and For All Time.

## AVOIDABLE ACCIDENTS.

While a workman was sawing a pipe a flying particle of lead lodged in one of his eyes. The injury was neglected, and the eye was removed at the end of the third day. Safety spectacles would have prevented the accident; proper attention to the injury would have saved the eye.

Two workmen were injured on the same day in the same department in one shop by stepping on protruding nails. In one case the nails had been covered with straw by a fellow workman who did not think "Safety First."

A workman was burned severely while removing the limb of a tree from a wire with which it had come in contact. He thought the wire was not dangerous. Moral: All dead wires should be considered alive.

## THREADING A PIPE.

The right way and the wrong way to thread a pipe are pictured in illustrations issued by the Bureau of Safety, Chicago.

In the picture showing the wrong way, the operator is pulling up on the stock and is standing in such a position that he would be liable to serious injury if the stock should slip. The man in the top picture is taking chances.

In the picture showing the right way, the operator is standing in such a position that he is in the clear. He is pushing the stock instead of pulling it, which is the proper practice.

One-eighth of 1,582 accidents reported to the Bureau of Safety were due to handling tools.

# NATIONAL SAFETY COUNCIL

*IN THIS DEPARTMENT ARE ARTICLES AND NEWS REPORTS CONCERNING THE NATIONAL SAFETY COUNCIL AND ITS LOCAL COUNCILS, FURNISHED EXCLUSIVELY TO "SAFETY ENGINEERING"*

## YOUNGSTOWN COUNCIL NO. 2.

MEETING on March 16 in Hotel Ohio. Twenty-eight members were present. President Dudley R. Kennedy presided. Secretary J. M. Woltz reported that he had delivered an address on safety before the Rotary Club in Houston, Texas.

FLYING SQUADRON.—It was arranged that a "Flying Squadron" be appointed to visit several plants and speak on safety to the workmen and safety committees and superintendents.

WHAT CONSTITUTES AN ACCIDENT?—The following report was presented by the committee appointed to consider the question; and it was arranged that the report be discussed at the next meeting of the council:

All accidents resulting in personal injury shall be divided into two classes:

First Class. Minor Injuries.—Minor injuries to include all injuries where an employe does not lose more than the remainder of the day; also all injuries where an employe returns to work immediately.

Second Class. Lost Time Injuries.—(A) All injuries resulting in lost time not to exceed seven days. (B) All injuries resulting in lost time requiring injured employes to lose more than seven days. Total disability and fatal injuries to be included in Division B, Second Class.

All reports shall be made quarterly, semi-annually, and annually, showing the percentage of increase or decrease based on man-turns of 10 hours per day, compared with the like period of the previous year.

A. C. Cook, claim agent of the Carnegie Steel Company, Youngstown, read a paper on "Organization for Safety." In the course of the discussion a member emphasized the importance of having a foreigner on each plant safety committee. The chairman indicated the importance of safety inspectors wearing goggles while in the mill—the force of example.

TEACHING OF SAFETY IN LOCAL SCHOOLS.—It was arranged that a letter be written to the superintendent of schools and the Youngstown Board of Education, urging that due means be taken to provide for the teaching of safety to pupils.

AUTO SPEEDING.—The chairman indicated that the members should co-operate with the Automobile Club in an effort to cut down the epidemic of motor speeding, especially on Sundays.

MAHONING VALLEY RAILWAY COMPANY—SAFETY CAMPAIGN.—It was reported that the company is to begin a public safety campaign, with an illustrated lecture. An outline of the program is to appear in the local press.

SAFETY MAGAZINE.—The magazine, which is being prepared under the auspices of the council, is to be published soon. All articles and advertising are to be passed upon by a committee of the council.

GOGGLE-TAGS. — Secretary Woltz showed tags which are distributed in his company's plant to foremen whose men must wear goggles. When goggles are broken, the tag must be filled out, showing when and where the breakage occurred, and the name and the check-number of the wearer. He also read report-forms which are filled out by foremen in regard to goggles.

BENEFICIAL EFFECTS OF LOCAL COUNCIL MEETINGS.—A member testified to

the benefit he was receiving from the meetings and indicated that more co-operation for safety would result if superintendents were friendly and on good speaking terms with workmen.

ORGANIZATION FOR SAFETY.—In his paper on the organization of work for safety, Mr. Cook said: "In organizing for safety work the first essential must be that the owners of the business and the superintendent or manager are not only in sympathy with the movement, but that they back it and convince the workmen that they are in earnest in their efforts to prevent accidents, and that it is being done for the employes' welfare. Considerable work must be done in the line of safeguarding machinery and dangerous places before the workman can be expected to take the movement seriously and lend a helping hand to the promotion of safety.

"The experience of the concerns most advanced in the work of preventing accidents has demonstrated that practically all points of danger on machines can be protected by simple guards, which will protect the men from accidental injuries and will not interfere with the operation of the machines or lower efficiency. These guards, though inexpensive, entail the expenditure of money that might not be sanctioned, were the powers that be not in hearty sympathy with the work, and vitally interested in it.

"Through the establishment of an organization; the appointing of committees, the personnel of which to be changed from time to time; the exercising of care to appoint men who are not only vitally interested, but who have time to give the matter required attention; the establishing of a rule making it the first duty of the foreman to protect his men against injury, and holding him directly responsible for all accidents to his men; and the education of the foreigner to understand he is first of all expected to protect himself and his fellow workmen against injury, coupled with enthusiasm and hearty co-operation of all concerned, we may hope to attain a gratifying reduction in industrial accidents."

## CHICAGO COUNCIL NO. 3.

REGULAR meeting of the members took the form of a dinner in the rooms of the City Club. After the dinner R. W. Campbell, president of the National Safety Council, delivered an address upon the development of the national safety movement and particularly the part the National Safety Council was taking in it.

POLICY OF THE COUNCIL.—Following Mr. Campbell's address, the chairman of the programme committee stated that in the opinion of the executive committee of the local council the time had come to decide upon the policy of the council insofar as the general character of meetings was concerned. After a discussion by many members, a resolution directed the chairman of the programme committee to appoint subcommittees for four various types of meetings and to stimulate a spirit of rivalry in the committees so that each type of meeting would be tried out under the best of circumstances.

Later in the evening all business affairs of the council were discussed, including the question of membership. Each member agreed to solicit the memberships of two or more "prospects" assigned to him. The meeting was successful and interesting.

## PITTSBURGH COUNCIL NO. 6.

MEETING on March 9 in Mellon Institute for Industrial Research, University of Pittsburgh. Dean Frederick L. Bishop, School of Engineering, Pittsburgh University, was chairman. Professor G. W. Case, secretary, recorded the minutes.

SAFETY METHODS OF THE PITTSBURGH RAILWAYS COMPANY.—J. W. Welsh, electrical engineer and traffic agent for the Pittsburgh Railways Company, gave an illustrated lecture on the company's safety methods. He showed how switches are locked when a man is on the line and how workmen report at the office before starting work on high-tension

lines and after completing the work. He exhibited pictures of large safety signs at many points where dangers exist for workmen and the public. He indicated that for service on the "trouble-wagon" care was used to pick out horses that had been in service on city streets for some length of time. Other views showed how telephone lines were protected by wire-bridge work from possible contact arising through breakage of high-tension lines and how the bridge-work was used also where high-tension lines crossed railroad tracks. The company has used the pulmotor and the "prone pressure" methods of resuscitation.

J. B. Donley, of the traffic department of the company, showed two reels of motion pictures, directing attention to the "seat hog" and the results accruing from improper alighting from a moving car and the crossing of tracks after alighting, without attention to "Stop, Look and Listen!"

UNSAFE PRACTICES ON PITTSBURGH STREETS.—T. H. B. Patterson, secretary of the Department of Public Safety, Pittsburgh, showed by lantern slides a number of unsafe practices on the streets, and directed attention to the dangers to pedestrians through the habit of crossing streets at the middle of blocks. In other views were signs which the department has printed for distribution to citizens where dangerous conditions exist.

The organization which gives the department the greatest assistance is the Boy Scouts. The scouts have been a helpful factor in the "Walk Rite" campaign in Pittsburgh. The campaign is yielding satisfactory results.

"Publicity is community education," Mr. Patterson said. "Particularly is it valuable in the education of our children —our future citizens—in 'Safety First' propaganda and civic duties. We have the opportunity in peaceful America to educate our children so that their patriotism may be coined into deeds of effective and practical service for the safety of our citizens and the protection of our property.

"Let me tell you of a wonderful force for the rendering of first aid to the victims of the open grate, which I have just discovered—the boy scout. Bless his intuition and devotion! Yesterday a boy, named Harry Stein, was sent to me. He could hardly talk English. He was a Russian Jew from our hill slum district, seemingly stupid, but on the breast of his shabby red sweater he wore, with the pride of a hero of the wars, a second class scout badge, and he had earned it. That little Jewish boy, the son of the widow of a Russian peasant, is an expert in first aid work.

"He saw a girl, with her clothing aflame, run from a house on March 3, and he remembered word for word the instructions found on page 259 of the 'Boy Scouts' Manual,' and he rushed through the crowd to throw the girl on the ground, roll her to and fro to extinguish the flames and drive the fire from her face where the inhalation of the flames would have meant death. The crowd resisted his efforts and some impertinent fellow drove him away from the girl, declaring himself to be a police officer. For fifteen minutes the crowd held the boy scout and watched the burning girl. She died the next day in the hospital.

"Within five minutes after I heard that story an order had been issued to every police officer in Pittsburgh to respect the second class scout badge. More than that, arrangements are being made for scouts of this class to instruct hall officers in public buildings in first aid tactics. I know from personal experience that most officers are lamentably ignorant, even in such simple cases as fainting or exhaustion, of what should be done. Lives are lost as the result of this lack of instructions."

Mr. Patterson showed a picture of one year's press clippings that referred to the work of the department of public safety in attempting to safeguard and educate the public through publicity. The clippings filled 29 volumes. He expressed the opinion that, for the moral condition of a community, much more could be accomplished through publicity and education than through strong-arm police methods. The boy scouts were active on Slipping Prevention Day, when, on "Saw Dust Saturday," they sprinkled sawdust over the icy pavements of many of the streets of the city.

## PHILADELPHIA COUNCIL NO. 7.

OPEN meeting on March 16 in the Franklin Institute. Eighty-five persons were present. Dr. Francis D. Patterson acted as chairman. Charles C. Black, secretary, recorded the minutes.

THE HAZARD TO THE ALIEN IN INDUSTRY.—H. H. Wheaton, special investigator of the United States Government, addressed the meeting on "The Hazard to the Alien in Industry, and the Necessity of Special Safety Precautions for Preventing Accidents to Those Who Do Not Speak English." In his address Mr. Wheaton said:

"The foreigner should be instructed in his own language before he be permitted to go to work in any dangerous place. The average foreigner is not equipped by training to enter into employment in this country. Fifty to 60 per cent of the foreigners employed in the Pittsburgh steel mills are men who worked on farms before coming to this country. The dangers of the steel mills are unknown to them. Many of them are absolutely misfits.

"We are advocating vocational schools for the purpose of preventing serious accidents. Every employer of alien labor to any considerable number should post warnings about the establishment, pointing out the dangerous machinery, holes and other places. These notices have been posted by several employers in the State of Pennsylvania; but not so many do so as should for their own good.

"Those who employ foreign labor in any large numbers should have safety organizations. They should have classes for the instruction of foreigners in safe methods and the way to avoid accidents. As the large manufacturers are so largely dependent on alien labor, it is up to them to care for their employes and to take advantage of the means of reaching them through education. There should be drills for fire or explosion about a plant, because the foreigner, not familiar with the nature of an explosion or the probable danger of a fire, becomes confused and causes panic."

One of the members thought that Mr. Wheaton's ideas were a little too far advanced, but that employers were slowly coming to this phase of the movement; further that, as his own company has many employes who cannot read their own language, it is hard to educate the men. Mr. Wheaton replied that the best way to handle the problem was to have the men instructed by foremen of their own nationality. In response to an inquiry as to whether there was any factory or educational institution where data could be obtained relative to the improvement shown by these educational methods, Mr. Wheaton recommended the Industrial League of New York City.

INSTRUCTION OF FOREIGNERS ON THE PENNSYLVANIA RAILROAD.—Vincent Colelli, Italian instructor for the Pennsylvania Lines, outlined some of the methods adopted. He has been an instructor in the language for two years, and he maintains that 55 per cent of the Italians in the employ of the lines can neither read nor write their own language.

He informed his audience that the Long Island Railroad is establishing a school to teach English to foreigners; and that, after workmen are able to read or write fairly well, they are made assistant instructors in the language. Use is made of lantern slides to teach dangers to foreigners and to point out the good result accruing from education.

The Pennsylvania Lines have notified all supervisors that they must help foreigners to understand the work and its hazards. The railroad, moreover, has a correspondence course of instruction, beginning with the alphabet and pronunciation and passing on to a description of the tools and their uses and dangers. When the aliens see some of their fellow-employes master the English language, they become ambitious to emulate this; and consequently there is little trouble in securing their interest. The money expended in this manner is well-spent; and the railroad considers it a saving proposition.

Answering a question as to whether the Pennsylvania Lines had instructors for different nationalities, Mr. Colelli said that, while they had endeavored to expand activities in this manner, they had only a small percentage of aliens other than Italians. It had not been found profitable to take in all nationalities over a field as large as that covered by the railroad.

EXPERIENCE OF ZINC COMPANY.—J. D. James, safety inspector of the New Jersey Zinc Company, Palmerton, Penn., indicated that the company had followed some of the advice given by Mr. Wheaton, and that it had had many years' experience in safety work. In 1901 the managers learned that many accidents were avoidable, and then completed an organization of safety inspector, secretary, and eight workmen, some of whom were foreigners. The plan has been maintained. One day each week is devoted to inspection. In the forenoon of that day an inspection is made to call the attention of employes to dangers; and in the afternoon first aid work is taken up and instruction given. Seventy-two employes at the plant are able to give first aid treatment. Accidents have been reduced 60 per cent, and a serious accident is now a rarity. Every attention is given to the alien; and little trouble is experienced in getting the men interested. They are anxious to learn; and those who become proficient in safety and first aid work are looked up to by the other employes. In conclusion, Mr. James told of the neighborhood work, and the playgrounds and amusements for employes and their families.

EXPERIENCE OF TELEPHONE COMPANY.—John Bailey, safety engineer of the Bell Telephone Company of Pennsylvania, told those present that his company was without the alien problem, as trench digging and ordinary labor items are given to sub-contractors. His company has carried on safety work for a year and a half, finding that it yields economic returns. Much attention is devoted to first aid work. The American Red Cross instructs employes. Crews were selected in each supervisor's district and the crews were instructed in the use of first aid kits and general treatments. Then eight or ten men in each district taught their fellows. Marked benefit has resulted from the work. Someone acquainted with first aid treatment is always available.

The consideration of hazards and the investigation of accidents are taken up by safety committees with the object of future casualty prevention. Twenty-two per cent of the Bell Telephone Company's accidents involve loss of time. All accidents are reported. Linemen account for the greatest percentage of the accidents—32 per cent.

## ROCHESTER COUNCIL NO. 9.

MEETING of the Committee on Safety Work in Schools and Homes on March 26. Five members present, also Herman J. Norton, supervisor of physical education. Dr. John F. Forbes, chairman of the committee, presided.

JUNIOR SAFETY COUNCIL.—Mr. Norton presented a tentative plan for the organization of a Junior Safety Council within the Rochester Chamber Local Council. It was approved by the committee, and arrangements were made to present it, for authorization, to the meeting of the executive committee. The Junior Safety Council is a novel idea, and one fraught with immense possibilities for good.

The plan provides for addresses and motion picture exhibitions at boys' clubs; talks to the directors of the clubs; the appointment of a committee of six to act as the Grammar School Safety Committee; reports from committees; the assignment of one general safety topic to each committee; the distribution of a letter, covering general safety points, to all members of boys' clubs; the distribution of two accident report forms to each club member for completion in case of accident; and the giving of safety prizes to schools for the winning reports on the various ways in which an accident may happen to any youngster or adult.

The secretary was authorized to ob-

tain copies of literature describing safety work in schools from the National Safety Council, for distribution among the various safety committees.

## JOLIET COUNCIL NO. 12.

SAFETY and health exhibit was the feature from March 20 to 28 in the Auditorium on Clinton street. The exhibit was arranged for under the auspices of the local council and the Public Health Central Council. It comprised items from the Chicago Tuberculosis Institute, the National Safety Council, the City Club of Chicago, and the Illinois State Board of Health.

MOTIF OF EXHIBIT.—An attractive six-page programme was distributed. The motif of the exhibit is summed up in the words from the programme: "This exhibition is designed to help the citizens of Joliet to realize that public health and safety are the most valuable assets of the community. Its protection is more important than the protection of any other form of property."

The morning sessions were devoted entirely to children. Several motion picture reels were shown and addresses made by several speakers.

PUBLICITY METHODS.—Extensive publicity was given to the exhibit by the local press, through placards in the down-town district and through notices posted in manufacturing plants. The council sent letters to manufacturing concerns in the town and vicinity, asking them to recommend their employes to attend. Small hand bills were given to the children in the public schools, and the youngsters were asked to take them home to their parents.

About 8,500 persons witnessed the safety films. It is felt that as a result of this exhibit the importance of safety has been brought home forcefully to the community.

## GRAND RAPIDS COUNCIL NO. 13.

OPEN meeting under the auspices of the council was held on February 26. About 300 working men were addressed by Dr. Collins H. Johnston, who spoke on tuberculosis.

James A. Kennedy, of the Industrial Board of Lansing, expounded the importance of accident prevention to the worker, emphasizing the fact that upon the employe rested the greatest burden of loss and the major burden of responsibility.

During the meeting two motion picture reels were shown: "An American in the Making" and "The Workman's Lesson."

## NEW YORK COUNCIL NO. 14.

IN response to the call issued by Marcus A. Dow, chairman of the organization committee, a representative number of members of the National Safety Council in New York met in the Hotel Biltmore on March 17. The purpose of this meeting was the organization of a local council. By-laws were adopted and the following-named officers were elected:

OFFICERS. — President, Marcus A. Dow, New York Central Railroad; first vice-president, Carl M. Hansen, Workmen's Compensation Service Bureau; second vice-president, Lancaster Morgan, General Chemical Co.; secretary, L. A. Larsen, American Locomotive Co.; treasurer, G. M. Cooper, American Bridge Co. Chairmen of committees: Membership, J. L. Murrie, N. Y. Edison Company; programme, W. G. King, Julius King Optical Co.; publicity, H. A. Bullock, Brooklyn Rapid Transit Co.; ways and means, C. L. Close, United States Steel Corporation.

MEMBERSHIP.—The by-laws provide that any active or associate member of the National Safety Council or any properly accredited representative thereof, duly certified by the secretary, and having his residence or place of business in New York City, or within 50 miles of New York where no local council exists, shall be eligible to active membership.

GENERAL MEETING.—The executive committee has decided to have the first

general meeting of the local council at the Railroad Y. M. C. A., Park avenue and Fiftieth street, at 8:15 p. m., April 20, at which the chief speaker is to be President R. W. Campbell of the National Council. President Dow will deliver an address on "Plans of the Local Council." Interesting features have been arranged for.

The executive committee has asked each member of the council to bring to the meeting some one who is not a member but who may be induced to join the council.

## BOSTON COUNCIL
### No 17.

SECOND meeting of the Boston Safety Society (Local Section No. 17 of the National Safety Council) was in the Walker Building on April 6. Henry A. Hale, Jr., chairman of the programme committee, presided.

MASSACHUSETTS ELEVATOR AND ESCALATOR REGULATIONS. — The regulations formed the subject at the meeting, the first speaker being Martin T. McLauthlin, of the Board of Elevator Regulations. He outlined the work of constructing the regulations, indicating the difficulty which confronted the members of the board in attempting to compile a set of regulations which would cover all conditions. He stated that when the present board ceased automatically to exist, there would be no supervision of the elevator regulations, a condition not conducive to public welfare.

Angus H. McDonald then talked in a general way on the application of the elevator regulations from his personal experience as an official of the district police. He emphasized the fact that additional assistance should be provided for the proper inspection of elevators, either by appointing additional men as deputies for the State police or by requiring cooperation from the inspection departments of insurance companies and having them submit copies of their reports on elevator inspections to the State authorities. He felt that by the second method much expense could be done away with.

Thanks to the two speakers having been voted, the meeting was open for discussion. The following are some of the interesting questions which were directed to Mr. McLauthlin or Mr. McDonald:

Mr. Whiting, Massachusetts Employes Insurance Association, asked if bevel plates were required to protect the shearpoint over doorways.

Mr. McLauthlin replied that the matter was left largely to the discretion of the inspector.

Mr. Wilkinson, American Mutual Liability Insurance Company, asked if lifting floor beams at the edge of shaftways could be permitted to replace the customary bevel plate.

Mr. McLauthlin replied that the practice was condemned by the board on account of the possibility of loading the floors near the edge of the elevator well.

Mr. Cary, A. M. L. I. Co., asked if a cleat, when installed in connection with a centering rope, could be considered as a lock.

Mr. McDonald replied that the centering ropes were usually of manilla; and many times an employe would cut the centering rope with his knife in order to release the elevator when he wanted to use it. If the usual form of elevator lock were installed, that could not be done.

Mr. Cary, A. M. L. I. Co., inquired in regard to the different heights recommended for rails on the hatchway type of elevator.

Mr. McLauthlin replied that 3′ 4″ was considered the best type for low elevator gates.

Mr. McDonald expressed his opinion in regard to the safety of open-well type elevators as compared to the fire-hatch variety. He felt that there was a preference for the latter from a safety point of view.

Mr. McLauthlin read a decision from Bulletin No. 6 (published by the Board of Elevator Regulations) regarding the construction of a pent house at the top of a shaftway to make room for accessibility to overhead mechanism.

Mr. Beyer, Massachusetts Employes Insurance Association, inquired in regard to the limit of definition of a sidewalk elevator, there being at present no limitation to the height, according to the rules.

Mr. McLauthlin admitted that it was the case; but said he believed there was no discrepancy in the regulations which would not apply to a sidewalk or plunger elevator.

Mr. Turner inquired if the counterweight attachment, referred to on page 91 of the regulations, was required on all elevators.

Mr. McDonald replied that it was.

Mr. Emerson, Arlington Mills, inquired if "durable wire rope" was permissible for counterweight cable.

Mr. McDonald said that it was taken care of by Article 31a, and indicated that the board considered "durable wire rope" to be a steel cable protected by a marline covering.

Question was then raised regarding paragraph 75e, which says that "gate shall close by gravity, and not by mechanical action of the car."

Mr. Stark inquired if the pantograph type of full automatic gate was prohibited.

Mr. McLauthlin replied that there was no legislation on that type.

Mr. Whiting inquired regarding the attitude of the State district police toward insurance inspectors.

Mr. McDonald assured him of their favorable attitude, requesting that complaints be sent to the district police on every occasion when they were warranted.

A general discussion then ensued regarding the proper hitches for cable ends. Mr. McLauthlin explained that several tests had been made, and that it was found that the eye splice and leaded ends were the only kind of hitches that developed the full strength of the cable. Care should be taken, however, in making a leaded end, in order that all strands be given an equal strain under load.

## COLUMBUS COUNCIL NO. 19.

OPEN inaugural meeting on March 25, with a large attendance of persons in local manufacturing and transportation interests. F. G. Bennett, president, acted as chairman.

Subsequent to the adoption and approval of the constitution and by-laws, H. W. Clapp, general superintendent of the Columbus Railway, Power & Light Company, gave an address on the safety movement in relation to the efficient management of corporations.

ROUND TABLE TOPICS.—The topics of a round table discussion were: "Trespassers on the Railroad," "Employes in the Plant," "Passengers of Transportation Companies," "School Children Roller-Skating in the Streets," "Traffic Laws," "Joy Walking."

PUBLIC CAMPAIGN.—The membership committee is at work on a systematic solicitation of "prospects." Plans are under way to have a two-day public safety campaign in the Chamber of Commerce Auditorium. President Bennett said: "We are certain it will go through with success; and all of us are agreeably surprised at the wonderful interest shown in this community relative to the work and service of the National Safety Council."

## BALTIMORE COUNCIL NO. 20.

AFTER a good deal of tentative and preliminary work the Baltimore Local Council, No. 20, of the National Safety Council has been organized. The offices of the local council are at 5 and 7 West German street. The officers are: President, A. A. Roth, president of the Roth Elevator Safety Device Company; vice president and chairman of executive committee, Holger Jensen, supervisor of liability inspections, Maryland Casualty Company; treasurer, D. C. Handy, chief inspector, Fidelity & Deposit Company of Maryland; secretary and counsel, A. J. Lilly, superintendent of accident and prevention division, Maryland Casualty Company; chairman of membership committee, Henry Stanwood, manager, Workmen's Compensation Service Bureau for Maryland; chairman of publicity committee, C. Braddock Jones, Henry M. Warfield & Co., Baltimore.

The council has about 15 members with approximately 40 representatives, and it has the backing of the leading business and professional men in Baltimore, a number of whom have signified

their willingness to act as honorary vice-presidents.

Up to the present date the meetings have been confined to the officers and the active members of the council, but a public meeting is to be held in April, at which the objects and value of the council are to be brought to the attention of the public.

The present plan is to have two public meetings, one in Baltimore City and one at Sparrow's Point, one of the largest industrial suburbs of Baltimore and the home of the Maryland Steel Company. R. W. Campbell, president of the National Council, will be the chief speaker at each of the meetings, one of which will be in the afternoon and one at night of the same day.

In contemplation also is a meeting before the members of the Baltimore City Club, at which speakers of national reputation in the "Safety First" movement will explain the work of the National Council and the possibilities of the Baltimore Local Council. Arrangements are being made for a safety exhibit under the auspices of one of the leading department stores of Baltimore.

Regular monthly meetings of the council are to be conducted immediately after the first public meeting, with intimate discussion of the various questions of interest to employers, employes, and members of the public from the standpoint of "Safety First."

The men behind the Baltimore Council have been interested in safety and accident prevention work, but heretofore have been working individually, each along his own particular line. The organization of the local council operates to co-ordinate and strengthen the work, and it will undoubtedly give a valuable impetus to the safety movement in Baltimore.

## CARTOONS FOR WORKMEN.

The subject of accident prevention during the past two years has become to nearly all large and small manufacturers as important as the question of output. A study of the causes of accidents in and about a plant will show that in most of the cases they can be traced to the carelessness of employes, ignorance, defective machinery and the lack of proper safeguards.

Only a systematic course of instruction and education of laborers, machine operators and foremen will ever overcome the first two causes. The employe must be taught how to do his work so as to avoid injury to himself and to his fellow workmen. He must be impressed thoroughly, and be made to bear in mind constantly, that carelessness on his part is likely to cause a serious accident.

The New Jersey Zinc Company of Pennsylvania, with the foregoing in view, has issued a "Safety First" calendar. Each month has a cartoon, representing a feature of a dangerous condition whereby carelessness is the direct cause of accident, the idea being to present to the workman dangers in a humorous fashion, believing that this method will create a more permanent impression.

## SMELTING COMPANY'S PLANS.

The American Smelting & Refining Company is putting into operation two bonus plans for accident prevention. The experiments are to be followed closely and, if successful, are to be extended. In the past six months good progress has been made in accident prevention at the plants, and a reduction of the number of accidents to the extent of more than 25 per cent is expected for the first quarter of 1915.

The secretary has forwarded to each plant the following announcement, to be posted in a conspicuous place in each department:

The Executive Committee, at its meeting on Wednesday, March 31, 1915, unanimously adopted the recommendation of the Committee on Safety and Labor that the company notify all general managers, managers, superintendents, and, particularly, foremen that each and every one will hereafter be held strictly accountable for accidents to employes under them, and that discipline, even to the extent of dismissal, will be administered when necessary in order to further the work of accident prevention. All action concerning the above is to be reported to the New York office.

The report of the company for 1914 has the following interesting particulars of welfare work at the plants:

Many years ago the company decided that it was advantageous to introduce, in connection with all 24-hour work, the 3-shift system, giving to all men eight hours' work, instead of ten and twelve as had previously been the custom. This decision was reached without regard to State laws requiring such action. At the present time less than 6 per cent of the company's labor works twelve hours daily, and even this unimportant amount is being eliminated. There is no doubt as to the desirability of instituting 8-hour labor in place of longer hours for the health and welfare of the men. In most cases the company has been obliged to pay the same wages for eight hours' work as they had previously paid for twelve hours, and the company has sought to offset the increase in the cost of operation by labor-saving devices. The two changes have gone hand in hand, so that the company is not able to decide as to the comparative efficiency of men working a shorter number of hours. The capital expenditure, however, in connection with these labor-saving devices has been large, but undoubtedly it has been a profitable investment. In one of the works where these devices have been installed to the greatest possible extent the company has been able to do the same amount of work with one-third the number of men as in another plant doing the same class and amount of work, but where labor-saving devices have been introduced only to a limited extent.

During the past year several of the States in which the company operates have passed laws requiring certain installations and activities to improve and conserve the health of the operatives. The company, however, is constructing such installations and actively combating all occupational diseases at plant after plant, irrespective of any legal requirements.

The company also is giving assistance to the men, partly through funds contributed by the men themselves, whereby physicians, medicine and hospital facilities have been granted, not only to the operatives, but to their families. One-half wages has been paid also in case of accident or sickness. The company has favored the passage of workmen's compensation laws in all of the States where it is operating, but it is not limiting the amount of assistance to the amount required by law. The accident prevention work has been pushed energetically, and gratifying results are being obtained.

At the more important works the company has taken out life insurance policies in favor of the wife or family of the operative to the extent of $500 for unmarried men and $1,000 for married men, payable not only in case of death by accident, but from any cause, and the project of carrying this insurance to a much wider extent, and not limiting it to operatives, is now under consideration.

The pension fund, practically all of which is invested, now amounts to $520,238.57. During the past year 63 applications for pension have been granted. The average age of the operating employes granted a pension was 62 years.

## "SAFETY SUNDAY" IN WALPOLE, MASS.

March 14 was known in Walpole, Mass., as Safety Sunday. Instigated by the Bird & Son Safety Committee, a Sunday afternoon entertainment and lecture on safety and accident prevention, in which 500 persons participated, was held in the Elite Theater in Walpole.

The idea of holding a lecture on Sunday afternoon was a novelty, but it proved to be a success and received the approval of the ministers of the various churches. Admission to the theater was by invitation only.

The entertainment began at 3 o'clock. After an overture by the Athletic Association Orchestra, George H. Dawson, chairman of the Bird & Son Safety Committee, spoke on "The Safety Movement." He asked everybody to talk safety, think safety and practice safety. He said in part: "A few words of advice and explanation are often of more value than a costly automatic safety device that, perhaps, fails to operate when most needed. Wherever there is machinery there is danger, whether it be a sewing machine or a 10-ton electric crane. No mechanical devices can take the place of the human brain. Every man must be

his own thinking machine. I do not mean to imply that safety devices, hand rails, gear guards and the like are useless. They are absolutely necessary, but they are insufficient in themselves."

Mr. Dawson said that early in 1913 steps were taken to form a safety organization at Bird & Son's and that a committee of four was formed, known as the Accident Committee, but the name was changed to Safety Committee. It soon became apparent that a much larger safety organization was necessary, and the present organization consists of one central committee of seven and five local committees. By means of a chart thrown on the screen, this organization was explained at length. Members of the local committees are skilled workmen, men familiar with the machines and the actual operations and conditions in their departments, who are in a better position than anyone else to find danger spots and to suggest practical remedies and safeguards.

Mr. Dawson said: "Looking back over the records, we find that during the six months from July to December, 1913, there were 204 accidents. During the next six months, January to June, 1914, 227 accidents. The increase in the number of accidents was a disappointment to the safety committees, but it spurred them to greater efforts. It is only fair to say, however, that the increase was due to the fact that we were recording every accident, however trivial, something that we had not done previously. During the next six months, July to December, 1914, the total number dropped to 165, as compared with 237 the previous six months. This year, in January, there were 25 accidents and in February the number dropped to 15, due not only to the work of the safety committees, but also to splendid co-operation by practically everybody connected with the Bird & Son industries."

Photographs taken in the Bird & Son mills were shown, to illustrate well lighted and well ventilated factories, fire protection, gear guards, guard rails, sanitation and emergency work. A moving picture followed, entitled "The Workman's Lesson," showing an accident through failure to use a safety device.

The chairman introduced David S. Beyer, manager of the Accident Prevention Department of the Massachusetts Employees Insurance Association, whose talk on the causes of industrial accidents was illustrated with lantern slides.

## AETNA'S SAFETY EXHIBIT.

The exhibit of the Bureau of Inspection and Accident Prevention of the Accident and Liability Department of the Aetna Life Insurance Company at the Panama-Pacific Exposition has several machines in operation, equipped with home-made safeguards, and a large number of other safety appliances, besides photographs of the use of appliances in manufacturing plants.

The machinery consists of punch presses, lathes, grinding wheels, drill presses and several types of tight and loose and cone belt shifters. The guards are enameled green.

Woodworking machinery has been mounted on special tables for showing the use of guards. Other tables have miscellaneous articles, such as set screws, lathe dogs, goggles, respirators, sandblast helmets and safety handles for wheelbarrows.

One of the main features of the exhibit is a miniature factory in full operation. The building, of mill construction with brick walls, is divided into two parts by a fire wall. Floor openings are protected on one side of the wall and not protected on the other. The guarded side has an outside smoke-proof tower fire escape and an outside brick elevator well, cut off by fire doors, with automatic gates at floor openings. The guarded side has a sprinkler equipment.

## SAFETY EXHIBIT IN WINDOW.

A department store in Pittsburgh displayed a safety exhibit in its showwindows, consisting of safeguarded machines in operation and various types of safeguards and other apparatus. People crowded about the windows, and probably for the first time visualized "Safety First."

A "Safety First" movement is an asset to both employes and employer.—*John H. Rech.*

## SAFETY IN LAUNDRIES.

Here is what is claimed to be a "Safety First" mangle. The chance of this fair laundry worker getting her hands in the machine has been reduced to a minimum. The danger at the point of intake of the rolls has been removed by placing in front of them along the entire length a steel fence or apron, which prevents the operator getting fingers, hands or sleeves drawn between the rolls.

"Safety First" Mangle.

With this guard adjusted properly, mangle accidents, so frequent in the past, should be eliminated or at least reduced materially.

The idea of "Safety First" is being tried out practically in Cincinnati's new $4,000,000 hospital where, in the laundry, care has been exercised so that every machine is fully protected. All cog-wheels and belts have been screened or enclosed, removing any possible chance of a part of an operator's clothes being caught in them.

Cincinnati spent about $30,000 to equip the laundry with safe machinery, but figured that a life saved or an accident prevented was worth the price.

Where the employer in this case has done his duty, such can not be said about the operator. Note the rings on her fingers, bracelet on her arm and loose, flowing sleeves. They present a hazard that should not be permitted. Correct clothing is as essential as is proper guarding.

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## SAFETY FEATURE ON SLAG POT.

When the slag pot, as shown in the illustration, is moved by the crane it is suspended by means of chain slings hooked around the lugs, to be seen at the top of the pot. The lugs formerly were cast with flat bottoms until the danger of the slings slipping out from under them was recognized; it was then

Courtesy of the Inland Steel Company.

**OPEN HEARTH.**

**Lugs on slag pot grooved to prevent chains from slipping off.**

decided to cast them with the grooves, shown at "A" in the illustration. The grooves hold the slings in place, regardless of any swinging motion which may be transmitted to the pot.

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Proper lighting plays an important part in safety work.—*L. H. Burnett.*

# UNDERWRITERS' LABORATORIES

## ORGANIZATION, PURPOSE AND METHODS.

*By W. H. Merrill, Manager.*

UNDERWRITERS' LABORATORIES, a corporation chartered November, 1901, by the State of Illinois, is authorized to establish and maintain laboratories for the examination and testing of appliances and devices, and to enter into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

Underwriters' Laboratories, Inc., is for service—not profit.

Its chief financial support has been received from the National Board of Fire Underwriters, under whose general direction the work is carried on.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The work is undertaken as one means of reducing the enormous and disproportionate loss of life and property by fire and the number of accidents in America.

The casualty features are carried forward in co-operation with the Workmen's Compensation Service Bureau.

The principal offices and testing station are located at 207 East Ohio street, Chicago. Branch offices are located throughout the United States and England and Canada.

The New York office is equipped for the conduct of examinations and tests of all electrical devices under the same conditions as those afforded at the principal office and testing station in Chicago.

The Chicago plant occupies a three-story and basement building of fireproof construction, containing something over 45,000 square feet of floor space, with a frontage of 266 feet. Yard space is provided for huts and large testing furnaces. The main building in Chicago is, perhaps, the best example in America of absolutely fireproof construction, furnished with fireproof finish and equipment and operating properly safeguarded machinery. Brick, terra cotta, concrete, stone, steel and iron are used exclusively in the structural features. The window frames and sash are of metal with wire-glass, the doors are of metal, the desks and filing cases in the main office are of steel. No wood or other combustible material is used in any portion of the finish. In addition, the plant is equipped with automatic sprinklers, and the machines, appurtenances, and lighting, heating and power hazards are safeguarded with every known precaution. In this model building the underwriters have gone to the extreme in adopting in their own property all the measures they are known to recommend in the property of others. Over one hundred persons are employed in the Chicago plant, which, with its equipment, has a value of approximately $200,000.

Officers: President, Henry C. Eddy, Chicago; secretary and treasurer, William H. Merrill, Chicago.

Board of Directors: The president and Charles H. Barry, Chicago; R. M. Bissell, Hartford; George W. Burchell, New York; F. C. Buswell, New York; A. F. Dean, Chicago; C. E. Dox, Chicago; A. G. Dugan, Chicago; W. N. Kremer, New York; W. E. Mallalieu, New York; John Marshall, Jr., Chicago; W. H. Sage, Chicago; Cecil F. Shallcross, New York.

Fire Council: F. E. Cabot, Boston; Gorham Dana, Boston; H. H. Glidden. Chicago; C. M. Goddard, Boston; Alfred W. Hadrill, Montreal; E. B. Hatch, Chicago; H. C. Henley, St. Louis; C. A. Hexamer, Philadelphia; W. E. Mallalieu, New York; W. H. Merrill, Chicago; E. F. Mohrhardt, San Francisco; E. A. Northey, Boston; H. L. Phillips, Hartford; R. G. Potter, Syracuse; Joseph S. Raine, Atlanta; W. O. Robb, New York; W. C. Robinson, Chicago; T. B. Sellers, Columbus; F. J. T. Stewart, New York; W. A. Stoney, New York; S. W. Stratton, Washington; Louis Wiederhold, Jr., Philadelphia.

Casualty Council: Charles A. Austrom, Hartford; J. C. Barden, Hartford; Richard H. Gunagan, New York; Carl M.

Hansen, New York; J. A. Holmes, Washington; W. H. Merrill, Chicago; Charles Nelson, New York; Robert H. Pearson, New York; J. W. Rausch, Baltimore; W. B. Shoe, New York; S. W. Stratton, Washington; Albert W. Whitney, New York.

### CONFERENCES.

For a number of industries conferences are established, consisting of the proper members of the staff of the laboratories and representative committees of manufacturers, to the end that full information as to examination and test methods may be transmitted to industries served by the laboratories' systems of inspections at factories and labeling, and the views of the industry as a whole on these items can be secured.

### LABORATORIES' REPORTS.

Summaries of the laboratories' reports are promulgated on printed cards filed according to classifications, and cabinets containing these cards are maintained at the offices of the principal boards of underwriters and inspection bureaus in the United States, at many of the general offices of insurance companies, by some insurance firms, certain Federal, State and municipal departments, and at the local offices of the laboratories in larger cities. Much of the information is also freely distributed by means of lists of fire appliances, gas, oil, mechanical and chemical appliances, and electrical fittings, and the results of the work in many classes of appliances are furnished directly to building owners, architects, users and all other persons interested by means of the laboratories' Label Service, under which goods are inspected at factories by laboratories' engineers and stamps or labels attached to such portion of the output as is found constructed in accordance with standard requirements. The service is described fully at the end of this article.

The aim of the founders of Underwriters' Laboratories was to secure the best and fairest opinion regarding the merits or demerits of every device, system, machine or material, in respect to life and fire hazards, and accident prevention, and to have the work so conducted and reviewed as to secure accuracy and uniformity in its findings. This object has been accomplished to such an extent that the majority of underwriters in the United States, many State and municipal authorities, plant operators, and a large number of architects, building owners and users either accept or require a report from these laboratories incident to their recognition of devices, systems and materials having a bearing upon fire hazards or accident prevention.

Underwriters' Laboratories issues no guarantee that its findings will be accepted or recognized in any case. Such assurances can only be obtained from the authority having jurisdiction.

### PROPRIETARY ARTICLES.

As manifestly the regular subscribers to the Laboratories cannot be called upon to cover the expenses of tests made at the request of others, a system has been established whereby a manufacturer or owner desirous of securing an examination and report by the laboratories on any particular device, system or material, is enabled to do so by first depositing a preliminary fee as evidence of good faith, and on completion of the work paying the balance of its cost as shown by accurate records thereof, which are kept in detail. As a warrant that an applicant will not incur costs beyond his expectations, a limit of expense is fixed in each case beyond which charges are not made. By this means an opportunity is afforded anyone at comparatively low cost to secure the opinion of the recognized authorities covering any device, system or material in its relation to fire hazards or accident prevention.

The amounts of the fees are in proportion to the nature and extent of the work required in examinations and tests.

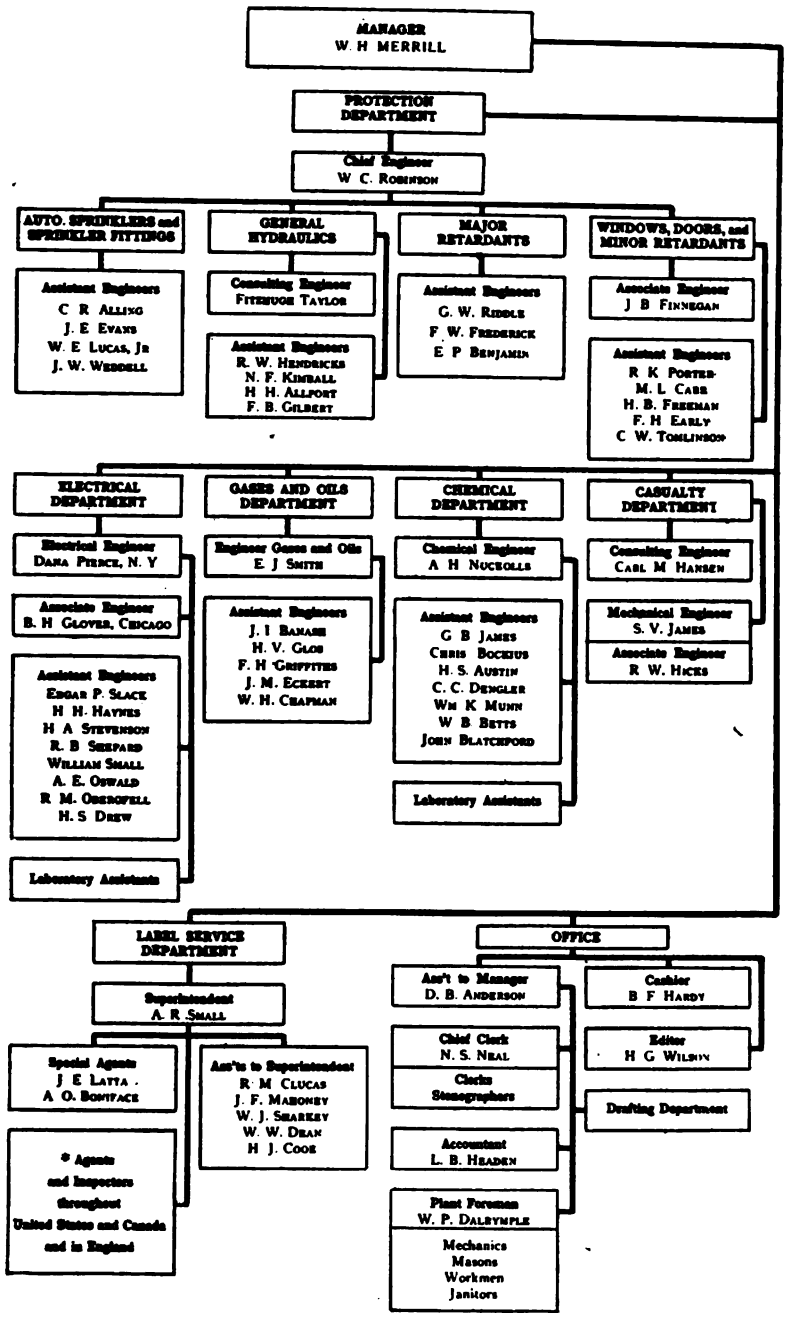
The cost of experimental work is practically the same in each class of device, whether samples show superior or inferior qualities.

The applicant's obligation to pay the charges is not, therefore, contingent upon the nature of the opinion rendered—whether favorable or otherwise.

### TESTS OF DEVICES.

Tests are made following the order in

# STAFF


MANAGER
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PROTECTION DEPARTMENT
Chief Engineer
W C. ROBINSON
AUTO. SPRINKLERS and SPRINKLER FITTINGS
Assistant Engineers
C R ALLING
J. E EVANS
W. E LUCAS, JR
J. W. WEBDELL
GENERAL HYDRAULICS
Consulting Engineer
FITZHUGH TAYLOR
Assistant Engineers
R. W. HENDRICKS
N. F. KIMBALL
H H. ALLPORT
F. B. GILBERT
MAJOR RETARDANTS
Assistant Engineers
G. W. RIDDLE
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E P BENJAMIN
WINDOWS, DOORS, and MINOR RETARDANTS
Associate Engineer
J B FINNEGAN
Assistant Engineers
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M. L CARR
H. B. FREEMAN
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C W. TOMLINSON
ELECTRICAL DEPARTMENT
Electrical Engineer
DANA PIERCE, N. Y
Associate Engineer
B. H GLOVER, CHICAGO
Assistant Engineers
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LABEL SERVICE DEPARTMENT
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Special Agents
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* Agents and Inspectors throughout United States and Canada and in England
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R M CLUCAS
J. F. MAHONEY
W. J. SHARKEY
W. W. DEAN
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Ass't to Manager
D. B. ANDERSON
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N. S. NEAL
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Stenographers
Accountant
L. B. HEADEN
Plant Foreman
W. P. DALRYMPLE
Mechanics
Masons
Workmen
Janitors
Cashier
B F HARDY
Editor
H G WILSON
Drafting Department

which preliminary fees are paid, work being begun usually within ten days following payment of the fee, in case the article to be tested is delivered to the laboratories in time.

Manufacturers and owners are welcome at the laboratories during the progress of tests upon their appliances. Advance notices of the time of making tests are not sent except upon request.

In the case of articles or systems involving a number of structural parts, or where large expense would be incurred for shipment, preliminary reports will be made upon receipt of fee accompanying drawings and complete description.

Complete examinations and tests of systems and machines will be made where installed at additional cost for engineer's traveling expenses to and from the nearest branch office of the laboratories, or to and from the principal office in Chicago.

The time required for the completion of test work varies from ten days to six months, depending upon the test specifications of the class. For appliances not classified no assurances as to the length of time necessary to complete the work can be given. Records of the last 5,000 appliances examined, tested and reported on show an average time, between the receipt of the sample and the issuance of the report, of approximately one month.

At the conclusion of the examination and test, the results thereof, whether favorable or otherwise, are bulletined to the various insurance organizations and companies subscribing to or co-operating with the laboratories' work, and a copy of this bulletin and the detailed report is furnished the applicant.

Whenever approvals of appliances or materials are ready to issue, the favorable opinion, promulgated as above described, is followed up by one of the following three forms of supervison over goods marketed under the approvals.

### FORMS OF SUPERVISION.

The oldest of these three forms is the Re-examination Service, in which the maker agrees, during the continuance of the approval, to pay certain fees annually (ranging usually from $5 to $30), with which the laboratories defrays the costs of obtaining samples in the open market or from the manufacturer and of making examinations and tests of the appliance one or more times yearly. Unsatisfactory features, if any are found as a result of the re-examination, are corrected by the maker on subsequent products.

The second form of supervision is the Inspection Service, which is regarded by the laboratories' management as superior to the Re-examination Service and is applied as far as possible wherever the Label Service is not considered practicable. The Inspection Service includes regular and frequent examinations and tests of products at factories by laboratories' engineers and the correction by the manufacturer of features found not in compliance with the standards of efficiency shown by the samples originally approved, together with supplementary examinations at the laboratories of samples purchased in the open market or received from inspectors and users, thus affording counterchecks on the factory inspection work and determinations of the service value of the product.

The cost of the Inspection Service is billed monthly in each case to manufacturers co-operating.

### LABEL SERVICE.

The third form of supervision by the laboratories is the Label Service. This is regarded by the laboratories' management as the most efficient and satisfactory of the three methods and is being utilized to a greater extent each year. The Label Service consists of inspections of devices and materials at the factories by laboratories' engineers, and the labeling of standard goods by stamps, transfers or labels, whereby they may be recognized wherever found; and, in addition, of systematic supplementary examinations and tests at the laboratories of samples of labeled goods purchased in the open market or received from inspectors and users, thus serving to countercheck the efficiency of the factory inspection work and to determine the service value of the product.

For a number of industries this service now includes inspection of the product at factories, check tests on materials purchased in the open market, service value determinations by re-tests of samples, which have been in practical use, and schedule estimates, showing comparative demerits noted on products. These elaborations are working to the decided advantage of all concerned, and are at all possible only under the labeling system. Fifty million labels were utilized on products during the year ending December 31, 1914.

Experience has shown that this method is in every way superior for the purpose of bringing to the consumer the article he desires, for the purpose of placing competition between manufacturers beyond the point where deterioration in the quality of the output is made necessary, and for the proper protection of the laboratories and the organizations cooperating with them, which are giving substantial recognition to efficient fire protection appliances.

It is also shown that an inspection and checking system of this nature can be efficiently operated under the laboratories' direction without calling the manufacturer to give undue publicity to his manufacturing process or subjecting him to any embarrassment or annoyance.

In addition to carrying the names of manufacturers regularly employing the Label Service in each separate industry in the records of the laboratories, all such manufacturers are freely consulted in all matters concerning standards of construction and iuspection.

## MOTION PICTURE SCREEN AT FRONT.

The Board of Commissioners of Nashville, Tenn., has promulgated a new regulation governing motion picture theaters, which requires that the machine booths be hereafter placed in the rear of the house and the screen at the front end.

While this provision of the building code does not apply to existing theaters, it does include such as may be remodeled, as well as regular theaters or other buildings or rooms which may be "used for the purposes of operating a motion picture show." Added to the requirement that it shall be on the ground floor, "shall front on the public highway and have ample means of exit at either end of the room in which the people congregate," this may be the means of decreasing materially the value of property not situated favorably in these respects.

Every ordinance or building code change of this or similar nature affects the desirability of real property for, or in respect to, fire insurance liability, and its probable effect upon the business prosperity of the occupant or lessee should be weighed carefully. The moral effect upon the community not infrequently causes the abandonment of well equipped and wholly safe risks due to the withdrawal of patronage to the supposedly safer establishments. The possibility of such an event must be anticipated also.

## NOTHING IS EFFICIENT IF IT ISN'T SAFE.

*By Letson Balliet, E. M. & C. E., Buckeye Belmont Mines Company, Tonopah, Nev.*

I cannot understand why there should be anything but extraordinary effort for safety by employers. Yet some employers hesitate at safety devices on account of expense. Workmen drawing wages lose time in personal caution when they are afraid. If an appliance is safe and the workmen know it is safe, they approach it quickly and work rapidly in absolute confidence that they are safe.

An employer who saves money by refusing to install safety appliances more than pays for his neglect in lost time Safety appliances are paid for whether they are used or not. It is simply a question whether safety appliances are to be charged up on the payroll, as labor each pay day, or charged once in the permanent equipment account.

Safety devices are right, necessary and a good investment, but, if the number of accidents is to be kept down, the man on the job must be taught watchfulness and caution.—*W. C. Capron.*

# "THE MAN ON THE JOB"

*COMPETITIVE ARTICLES RELATING TO THE PREVENTION OF INDUSTRIAL ACCIDENTS BY EDUCATION OF WORKMEN, METHODS OF MANAGEMENT AND MECHANICAL SAFEGUARDS*

*Conditions of competition published on page 366.*

**No. 160** SAFETY ENGINEER; HIS WORK AND SOME SUGGESTIONS ON ACCIDENT PREVENTION.—To the old-time inspector and his suggestions are due much of the credit for the perfection of standard guards that mechanical, inventive genius has perfected and today are seen on many dangerous machines.

The proper safeguarding of machinery has helped to reduce accidents, probably 25 per cent. Quite a change from the time when the question of safeguarding was a thing, practically, unknown and owners and employes alike were arrayed in opposition against the then established methods. One not versed on the subject can hardly imagine the struggle of the inspector of that time in convincing them to the contrary; sometimes it took all of his stock in trade, consisting of experience and persuasive eloquence, and even the demonstration of some crude device quickly made to meet a requirement, and once undertaken it was up to Mr. Inspector to make good, and there can no longer be any doubt that he did; when we stop to consider the development of the modern plants and machinery, with the thought that is being given to the question of accident prevention by men high up on this subject.

Statistics agree that about 90 per cent of accidents are preventable, and this has not been disputed by any authentic authority, as far as the writer knows.

The most important question to manufacturers and others employing labor as well as to workmen themselves is how best to go about the work to accomplish the desired results and reduce accidents to a minimum. Where the co-operation of owners and managers has been secured and machinery guarded and first aid treatment given quickly a marked reduction of accidents and hospital cases is in evidence; which proves that modern methods are giving good results and is undisputable proof in favor of the new system over the old way of using unguarded machines and wrapping up wounds, without cleansing and with any old rag that was handy.

Many of the larger manufacturing concerns have put in emergency hospitals, with trained attendants, to which all employes are requested to go if sick or hurt, and many are able to return to duty in a short time after treatment. The more serious injuries are sent to other hospitals or a doctor is called. Practically all factories now keep first aid remedies, and doctors agree that great benefits are to be derived from this system, this being a part of the great co-operative plan of owners and managers in caring for those dependent.

In many large plants a recommendation has been made for division into departments, each to be under the charge of a competent foreman specially selected as to his fitness to handle properly the work in his department. It has had splendid consequences and has decreased accidents 40 to 50 per cent. The foremen should meet the managers at stated intervals and talk over the progress made and matters of general interest for the safety and health of the employes or any accidents that have occurred and means to prevent future ones of similar nature.

Such meetings have had very beneficial results in bringing out many interesting things in connection with matters that have increased the efficiency for safety to employes and for their protection. Also the interests of the department foremen have been increased to such an extent that each has striven to obtain even greater results under the safer conditions of those working under them.

The appointment of a factory safety inspector for a large plant is another way recommended to lessen accident frequency, this individual to make rounds daily, note conditions in general, report misplaced guards or new ones needed and defective equipment wherever found, also any carelessness observed on the part of employes and report directly to the foreman in charge, with a copy to the manager, who takes such action as seems best to meet the case. It is plain to see that by such a method the manager is able to eliminate the causes of accidents, and with the inspector's advice the proper steps can be taken to expel the trouble, always bettering the general condition of the plant, morally and physically. Insurance inspectors find many of these things on periodical visits and report them; the local safety man is the man on the job, going over the factory daily, which should bring quick effects.

Enforcement of factory rules is another important matter in connection with safety work, and it must not be overlooked. The posting of rules and allowing them to be disregarded shows very poor management. When a rule is posted every employe should obey it, or be called to the superintendent's office and asked if he thoroughly understood the order; if not, be instructed and given a copy to keep and read; no excuses to be accepted afterward. A disregard of rules should be considered a great offense against the management and should be dealt with seriously in order to have the desired effect upon all interested. The posting of attractive signs at points of danger and in conspicuous places has given excellent results. These silent reminders have caused employes to stop and think, because the eye had caught the warning in time, although the mind was lost in thought, and thus prevented an accident. I believe that bulletin orders and signs should be changed from time to time in order to get the best results from these sources. One becomes used, in time, to conditions encountered daily and passes them by, but something new in color or design at once excites man's natural curiosity, causing the employe to think. Once a man stops to think he becomes a safer and a better man in all his undertakings. *Think first and safety follows.*

Employes should receive the encouragement of the employer for being prompt and efficient in their work, thus keeping them better contented while putting in the allotted time at their duties. This can be done by a slip in the pay envelope, an open letter or a short talk at a chosen time by one in authority, and it will be found by getting into closer touch with the employes that your interests and theirs will be greatly benefited. I am convinced that the majority of employers have not given this subject due consideration. There is nothing like a heart-to-heart talk with the other fellow in promoting the general welfare of those depending on you for sustenance and who are less capable of judging many conditions that tend to raise the moral and physical hazard in a large manufacturing plant and its employes until it will stand out distinctly in a class by itself.

I believe that carelessness on the part of employes and lack of time and attention to study general conditions by the employer are to blame for many bad experiences, causing accidents that have, in some instances, come to the writer's notice; and all will agree that it is time to cut the needless number of accidents to the least possible limit. Carelessness should not be tolerated; better discharge a man than to cripple him. Humanity demands this of all who labor and all who employ labor.

A few years ago a general impression among managers and superintendents was that the inspector had to complain of certain conditions in order to hold his job. Nothing was farther from the truth. That man had seen conditions under which men were injured and, being

a mechanic, needed no argument to convince him that it was money well spent to make a dangerous machine or place safe, and he took to the insured the information free. To one who has seen the change that has taken place along the lines of accident reduction it is very encouraging.

When the year's experience is tabulated and laid upon the table you will find the items relating to accidents have been greatly decreased, thus saving time and money in caring for the injured and preventing the loss of time of a valuable employe, to say nothing about the misery prevented, remembering that sanitary conditions, ample light and room for operations, employes drilled in caring for themselves will eliminate many accidents that are now charged to carelessness, a condition for which we find no excuse. It will need no argument to convince you that it pays in dollars and cents to carry on a work of "Safety First" in every department.

The safety engineer is still in the field, pushing the good work along. Many articles have been written and much literature published and distributed by practical men until the "Safety First" signs can be seen everywhere and read from the car window as one is being hurled along at 40 miles an hour. *It is in the air. It is not a fad, but a fact.* The man who does not accept facts is behind the times. Get into line and help the cause along. There is still much work to be done in educating employes and enforcing safety methods.

Adopt this slogan: *Think first and safety follows.*

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**No. 161** ONE TIME WHEN "SAFETY FIRST" WAS THE CAUSE OF AN ACCIDENT.—While attending the Industrial Safety Exposition in Columbus, Ohio, the writer witnessed an accident that was due directly to the exhibition of a safety appliance. I am sorry to state that the accident had the ill luck to occur directly in front of the building where the exposition was being held. A manufacturer of a fender for autos was exhibiting the practicability of his safeguard. The exhibition consisted of placing a bag of sand, which weighed about 100 pounds, in the middle of the street, and the auto with the fender attached would come along at the rate of about 15 miles an hour and pick up the bag of sand. The exhibition attracted a large number of people, including several auto drivers. One driver of an auto was interested so much by the fender that his car collided with another car, and one of the cars turned turtle and the other machine was wrecked. This accident caused considerable comment, and was taken as a joke by many.

Just a word regarding this exposition, that was held under the auspices of the Industrial Commission of Ohio. The success of the show was due to Victor T. Noonan, Director of Safety, Industrial Commission of Ohio, who should be commended for making the first safety show of Ohio one grand success. The safety appliances at the show were of the best in the country, and the hospitality that was extended to all who had the pleasure of attending the show will never be forgotten. One of the reasons for such a successful show was that the exhibitors were given exhibition space free of charge. This is a step in the right direction for all safety shows that are contemplated for the future.

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**No. 162** EDUCATE THE EMPLOYE UP TO THE "SAFETY FIRST" IDEA.—It is now conceded generally, I believe, that the safety device has not entirely fulfilled its mission in the industrial world. It has received the support of safety engineers and technical men in the broadest manner; it has been given every opportunity to prove its effectiveness, but it has beyond a doubt fallen down in many instances where good results were looked for hopefully.

There is no denying that protective appliances have been the means of preventing many injuries, but such devices have fallen far short of eliminating industrial accidents, or even reducing them to a satisfactory extent.

It is a fact, I believe, that the reduction of industrial accidents, taken the world over, which can be credited reasonably to these protective measures, has

# QUESTIONS APPLYING TO THE GAS INDUSTRY

**Articles on any of these subjects are requested for The Man On The Job department of "Safety Engineering."**

1. Are all oil lines located where there is minimum danger from fire should a leak develop?

2. Are there shut-off valves outside of the oil pump buildings to be used in case of accident, and do both the day and night forces know the location and use of such safety shut-offs?

3. Where is your kerosene, alcohol, paint oil, gasoline, etc., stored? What precautions are taken as to its safety?

4. Where is pentane stored and how?

5. What type of lights are used in purifier houses? How are they protected?

6. What warning signs are displayed about the plants and where?

7. How many men are used to charge or purge a purifier box?

8. What instructions do foremen receive as to any job where there is possibility of being exposed to live gas?

9. In what manner are floor wheels of purifying box lid carriages guarded?

10. Are passageways around purifying boxes kept unobstructed, and are openings in floor protected with guard rails and floor risers?

11. How is tar separator guarded?

12. Is there a copy of "Directions for Operating" hung on the wall of the generator room containing instructions in reference to cleaning the wash box of the set, and are the men familiar with these instructions?

13. Who is immediately responsible at the works for seeing that the instructions for cleaning wash boxes are carried out? What are these instructions?

14. How are seal pots guarded?

15. Are there any loose floor plates that are liable to drop and injure anyone? How often are floor plates inspected? By whom?

16. Are open ends of operating floor, stair and other openings in floor provided with floor risers and guard rails?

17. Are passageways kept free from obstructions, and are clinker bars, etc., kept in racks when not in use?

18. In what manner are intake ports of blowers guarded?

19. How are flywheels of blower engines, countershaft pulleys, blower pulleys and belts guarded?

*(Continued on next page.)*

# QUESTIONS APPLYING TO THE GAS INDUSTRY

(*Continued from preceding page.*)

20. What precautions are taken as to fitting bins and shelves?

21. Are pipes, fixtures, stems or other projections permitted to protrude from bins into passageways where they might injure persons coming in contact with them?

22. When hanging tools on wall, what means of support are used?

23. What clearance does method of suspending fixtures and material in storerooms and showrooms give? Are fixtures safe?

24. Are overhead ledges and projections in coal shed and coal trestle kept free from coal? How?

25. Are stairways and platforms on holders provided with an intermediate rail between handrail and base?

26. Is there an intermediate rail on holder gallery in front of siphons?

27. Are there any gasholders or oil tanks located on open lots? If so, how are the stairs or ladders guarded to prevent other than employes having access to same?

28. What kind of barricade is used in daytime and what kind at night?

29. What precautions are used in trenches dug through soil which is liable to cave in?

30. What precautions are taken to see that pipe stored on roadway does not extend into footway at street crossings?

31. In what manner are service carts and street main tool boxes guarded when left over night on public highways or parkings?

32. What is the largest size of live gas main that you allow to be cut without using a stopper in addition to the bag?

33. What inspection is made of stop and drip boxes? How often is inspection made?

34. Are men instructed never to tap a live gas main in a tunnel or where overhanging earth might prevent the free escape of gas?

35. How many men are instructed to be present when working in a gas-charged atmosphere?

36. What instructions are given to ordermen as to trap and other doors they use before leaving consumers' houses?

37. Are employes instructed to place tools, boxes, pipe, etc., in safe places in consumers' houses so they are not likely to be tripped over by the consumers?

38. Are all water heaters or other gas appliances connected to flues when set in bathrooms or other small rooms? Are all appliances consuming 50 feet or more gas per hour flue connected?

been less than 30 per cent. I am therefore of the opinion that when we mechanically protect the working man from danger, or rather when we think that we have protected him, we have taken but a short step in the direction of actual preventive endeavors.

Probably in no phase of life does the human equation enter so strongly as it does in the attempt, not only to protect the employe but, to arouse in him at the same time a realization of the great need for such protection and further to secure his co-operation and assistance, without which support our endeavors will go for naught.

Every being has an individuality of which he is supremely jealous. This is one of the fundamental principles of our very existence and it must ever be present in our mind when dealing with the employe. One of the inherent attributes of this egoism is a spirit of antagonism, aroused (unconsciously many times) by any innovation which tends to upset the routine of daily life or which places any impediment in that "path of least resistance," which is so tenaciously adhered to, even though such innovation be solely for one's benefit.

This attitude undoubtedly produces in many instances a feeling of indifference or even contempt toward such innovation as the employe regards as silly or useless, and such feeling can be overcome only by demonstrating to him in a forceful way wherein he is wrong. This can alone be accomplished by systematically educating the employe up to an appreciation of the real worth of and necessity for such protection. It is then and not until then that a protective measure becomes of real value. When this idea has become absorbed thoroughly by the employe in connection with even one or two devices he is apt to begin to look for merit in any other device in which he may come in contact, and ere long he is disseminating his knowledge among his fellow laborers.

The average working man is prone to show less alertness of mind and activity of body as he feels that he is being mechanically protected from danger, and he concludes that he is thereby relieved from the responsibility of watchful care and prudence during every moment of the day. Consequently the necessity arises again for teaching him that such mechanical protection is not to relieve him of thinking at all times but is to save him should his mental process momentarily fall down.

Here lies a big field for the safety inspector, and his most valuable asset should be the foreman on the job. They should work hand in glove; for once awaken in the mind of the foreman a real interest in the inspector's endeavors his enthusiasm will begin to radiate, to be absorbed by those under him. He is the pivotal point on which an accident prevention campaign is apt to swing. Let him understand and appreciate that the "Safety First" idea is economically and commercially sound. Let his interest become aroused so thoroughly that he will take the greatest pride in reporting that he has completed the job assigned to him without a single accident; then you will indeed have taken a good long stride in the right direction; for with the co-operation and assistance of such a foreman you have a good chance of also materially reducing the insidious little accidents that no safety device can prevent.

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**No. 163** THE SUCCESSFUL "MAN ON THE JOB."—What comprises "The Man on the Job?" Not always the man who reaches his place of employment a few minutes before the whistle blows or possibly lingers at his bench after the closing whistle at night. He must be more than a careful observer of working hours.

To be successfully "The Man on the Job" requires that one have at all times a keen, watchful eye for the interest and welfare of the employer, keeping at all times in mind the thought that whatever brings success to the employer is bound to also benefit the employe.

He should be so interested in his duties and the success of the work given him to do that he would have no time for attending to the business of others or listening to gossip or complaints of a fellow employe.

The successful "Man on the Job"

should at all times be interested in the welfare of himself and his fellow workmen, and should use every precaution against accident to himself or other employes and report quickly to his superior any defect in machinery or working tools that would be liable to cause accident or injury.

To be a successful "Man on the Job" means that every man should be fitting himself for the position next higher up, as vacancies very often occur quickly and unexpectedly. How often employers of labor find it necessary to engage an outside man to fill a vacancy because they have no one fitted for the place when a vacancy occurs.

To be simply content with the position occupied, without looking forward to advancement, is not the kind of employe that is being sought after by employers of labor.

We sometimes hear of employes who have been in positions without promotion or advance in salary for 25 years and longer, and when we hear of such cases we cannot help but feel that the workmen themselves must be at fault, for surely in such a length of time vacancies were bound to occur and places could have been found for the right men, if they were qualified to take steps higher. Such men usually lay the blame on bad luck, which they generally claim to have been born with, and not to any fault or neglect on their own part.

Some of our railroad presidents today are men who, in the beginning of their careers, worked as section hands, telegraph operators and sometimes as brakemen, but, while serving as such, they were always looking forward to and fitting themselves for positions higher up, and as a rule the positions sought them, rather than they sought the positions.

If each man would make up his mind to be "The Man on the Job" there would be less idle men walking the streets of New York and less dissatisfaction among the laboring classes in general, because it is a matter of recognition that all men are laborers in the true sense of the word.

## PRIZES FOR MARCH ARTICLES.

*First Prize. No.* 159. *Richard Hoag, Creamery Package Manufacturing Company, Chicago, Ill.*

*Second Prize. No.* 158. *John C. Brennan, Foreman, Billet Yard, Illinois Steel Company. Joliet, Ill.*

*Honorable Mention. No.* 157. *J. D. Hackett, New York City.*

*Other meritorious articles were contributed by B. M. Moseley, Springfield, Mo., and J. J. Sproul, Manager, Service Department, Otis Elevator Company, Harrison, N. J.*

## COMMENTS BY MEMBERS OF THE COMMITTEE.

In my opinion, article No. 158 is the best. The foreman is one of the biggest factors in accident prevention and if, as stated in this article, he will study the men working under him and place them on jobs best suited to them, a great number of needless accidents will be prevented. Our Safety Rule Book contains the following: "Judgment should be used at all times in placing men on jobs; heavy, slow men should not be placed on jobs where light, quick men are required. Slow-thinking, unintelligent men should not be placed around machinery or in places where presence of mind is required, for, by so doing, the probability of accidents is increased many times."

The following extract from article No. 159 contains a great deal of truth: "To promote and keep up conditions most conducive to safety requires indefatigable effort on the part of the

employer and employe; in other words, the only effective method to attack and solve this problem lies in intelligent co-operation."

I vote for No. 158 because the "brother's keeper" idea is so well handled. All foremen, superintendents and general managers are now being "safety educated" to their responsibilities in this great human work, "Safety First." We are our "brother's keeper." The article is the best in the March issue. The foreman must know and keep that "Mr. New Man" instructed in safety if he is to have an efficient machine of his organization.

No. 159, in my opinion, is one of the best, if not the best, articles that have appeared in this series. For clearness of expression and subtle reasoning it surpasses any article I have seen. My vote goes to No. 159.

My choice is No. 155. The five letters, T-H-I-N-K, are the greatest factors in "Safety First." All movements for "Safety First" are lost unless the men will "think." If all employes would "think," accidents would be reduced more than 40 per cent within the next six months. Make "think" the slogan for all "Safety First" movements.

My choice for the best article is No. 158. The writer of that article shows clearly the results that can be obtained by a systematic educational campaign along safety lines. It is bringing men more and more to the realization that they are indeed their brother's keeper. As the records show in plants that conduct their safety work along these lines, accidents have been reduced almost 70 per cent.

No. 158 for first place. I have picked this article for first place because it recognizes that much or most of the responsibility rests with the foreman, a fact that I have frequently asserted myself. No. 159 deserves consideration and I would award it second place, by a narrow margin, over No. 155 for honorable mention.

Good and efficient safety work is the theory of right thinking, science of mind, the ability of a man or organization to make mind control action. We progress right only as we think right and no man is a safe man who is not a safe thinker. Personally I think that safety articles are best that treat of the subject broadly rather than specifically. Preach safety and the individual will apply his knowledge to the job in hand rather than apply a particular safety method to a given thing or place. In other words, make safer individuals. I vote for No. 159.

The author of article No. 159 has outlined a "Safety First" campaign that I am sure would be productive of very satisfactory results. The "Safety First" movement, as the author of this article sets forth, is not a one-sided affair but requires the co-operation of both the employe and the employer. A safe working force and a safe plant benefit the employes by a reduction of suffering and a steadier income. They benefit the employer by increased efficiency of the men on account of their sense of security from accidents, by reduction in compensation claims and by decrease in "turn over" on account of satisfied employes. I consider No. 159 the best in the March issue and cast my vote for it.

It was difficult to choose between Nos. 157 and 158, because both emphasize the presence of, and evolve a solution for, two of the main causes of accidents with which we have to deal. It appears to me, however, that the preference should be given to No. 157 as the most practical, as it deals with

the most pregnant opportunity for "Safety First" advancement.

I suggest No. 156 for first prize. This is a good article on elevators.

No. 159 is worthy of the first prize. The writer of the article handles the subject as if he knew what he were talking about.

I cast my vote for article No. 156 as being the best article in the March group of articles. There is so much reiteration of advices accruing from "Safety First" that when an article contains some specific suggestion or sounds some new note, I immediately pick this out for award. People are so accustomed to riding in elevators that they sometimes fail to realize the dangers. Safety engineers have been advocating the use of the car gate for some time.

I cast my vote for article No. 159 for the first prize. The article is well written, and the writer is no doubt well educated along the lines of "Safety First" in order to be able to put up an article with as high a percentage of good points in the way of advice and information. The following are some of the main thoughts in his argument, and are well worth the reader's attention:

Earnest investigation,
Primary causes of accidents,
Inadequacy of safeguards,
Exhaustive periods of labor,
Speeding up systems,
The employment of insufficiently trained men in hazardous positions,
Co-operation founded on coercion, condemned by the writer,
Wiser to spend money to prevent accidents than to settle claims,
Making of labor conditions safe and congenial,
Enforcement of safety rules,
Better to invite, rather than demand, attendance at safety meetings,
Weakness of humanity—carelessness, over-confidence and absent-mindedness,
Eyes to survey conditions, and brains to analyze.

The article is pre-eminently an employe's article, and to all employes I would especially recommend it, as the writer has shown ably how it pays for every employe to be interested in the "Safety First" movement. In my opinion, this article stands in a class by itself. It is well worth a place in your valuable magazine, and I am sure it will win the first prize.

Safety first from a workman's point of view, No. 159, gets my vote for the best article. One paragraph is especially good and should appeal to every workman: "The indisputable fact that the worker bears the brunt, endures the misery and experiences the distressing effects in all accidents ought to make this proposition ('Safety First') of sufficient interest to arouse his determination and willingness. He should give this movement serious thought, because, by reason of his position, he is especially a directing spirit; it is from his mind and expe-

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*SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The prizes are awarded for articles describing or explaining Practices, Methods of Management or Operation, Regulations, Systems, Recommendations, Suggestions, Ideas, Safeguards, Safety Devices, or Apparatus. The Committee of Award will be influenced, in each case, by the evidence which the article gives of its writer's knowledge of and interest in accident prevention in general, as well as by the practicability and range of the concrete suggestions made and, in cases where these suggestions are peculiar to some particular industry, the understanding shown of the hazards of that industry.*

*The merits of all articles will be passed upon by a Committee composed of Safety Engineers, Managers, Superintendents of Plants and Workmen.*

*Drawings, sketches and photographs are invited whenever they will aid or supplement the descriptions in articles.*

*Contributors are requested to be as concise as possible. Articles should not exceed the limit of 800 words. The competition is open to everybody competent to write on the subject without the requirement of a consideration of any kind for the privilege of competing.*

*Blanks upon which to submit articles will be furnished on application, but any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

rence that the most helpful suggestions emanate."

The writer of No. 159 receives my vote. We inspectors are aware of the fact that causes produce effects, and some causes produce catastrophes. Reading such articles written by master minds spurs us on to greater efforts and educates us so that we can convince those who operate or control dangerous machinery to carry out reasonable recommendations.

I cast my vote for article No. 157. The idea contained in this article is, to me at least, an entirely new factor in accident prevention work and it is one that, I think, should have the most careful consideration by the employer of a large number of foreign laborers of different nationalities.

## "SAFETY FIRST" FOR BUSINESS RECORDS.

Nowadays "Safety First" means more than a phrase of caution, serving to minimize the chance of personal injury. It is the watchword for an increased standard of efficiency in every branch of business practice.

The strides made recently in the profession of efficiency engineering attest the increased corporate interest in the idea embodied in "Safety First." Certainty is displacing chance in business life. It pays to keep an eye on details; to eradicate the chance of loss through carelessness or deterioration of product, or misplacement or loss of records through individual error or materials of inferior quality on which the records are made to be preserved.

The cry is for "Safety First," even in a firm's stationery, record and ledger books. An illegible record may be as serious a menace to the life of any business as the light that fails the navigating officer who stakes the safety of his vessel on its guidance.

The business that builds for the future insures the preservation of its books by specifying papers that will stand the strain of constant handling and the telling wear of time and climate.

No longer is it regarded good economy to save in this branch of a firm's routine. Papers of inferior quality are necessarily bleached with strong chemicals, whose influence does not cease with manufacture, but which weaken the fibre of the paper and cause deterioration with time, climatic conditions and handling. Cheap papers fray, tear easily, and the reaction of the ink with the chemical constituents of the paper causes the gradual fading of the record, and an illegible record is no record at all.

As good paper and poor paper have like appearance when new, it is becoming more and more the safe practice nowadays to inquire into the circumstances under which a paper is made before specifying it for important documents, such as public records, deeds, insurance records, etc. It costs more to make good paper, but good paper is a form of insurance where cost is reckoned through a term of years, and permanence is purchased at a cost which in the end proves considerably lower.

A good paper is made of clean, white rags, nullifying the need for bleaching by means of strong, corroding chemicals. Good paper will not roll, tear, "dog-ear" or shred, and will not grow yellow and brittle with age. A paper made of the right materials should be tough without roughness, and it should be possible to make an indefinite number of erasures without smudging or marring the writing surface. First-class paper permits of several erasures in one spot before the eraser or knife wears through. If the right paper is used, such erasures should allow the pen point to write over the spot without sticking, spattering or blurring.

These are a few sign posts on the "Safety First" highway—the right way to buy a firm's stationery, record and ledger papers. A safe play is the winning play in the long run, and the business that builds for tomorrow is the business that recognizes that permanence in records is the surest, safest pacemaker in its corporate growth.

# "THE FIGHT AGAINST FIRE"

*COMPETITIVE ARTICLES RELATING TO THE CONSERVATION OF LIFE AND PROPERTY BY FIRE PREVENTION AND DEFINING FAULTS OF CONSTRUCTION AND HAZARDS OF PROCESSES*

*Conditions of competition published on page 372.*

**No. 51**

MORAL HAZARD.—In the fight to decrease the fire waste I find that back of most of the fires which occur is a hazard to which little attention has been given. It is true that long ago the insurance companies found that such a hazard existed, and they have endeavored as far as within their power to bring the matter before the general public, but the public has looked upon this hazard as a "scare crow" manufactured by the insurance companies. Nevertheless, the hazard does exist, and will exist as long as time lasts and fire insurance can be secured. It is the moral hazard, and the citizens of every town, city and State are responsible to a greater or less degree for its existence.

In times when business depressions and uncertainties exist this hazard becomes more vivid, and usually at such times the local insurance agent desires to get more premiums and is over zealous in trying to get business for his company. He loses sight of the fact that over-insurance produces an increase in the moral hazard. The insurance companies have placed the responsibility of safeguarding their interests in the hands of their local agents, not knowing the exact conditions which exist in the localities from which the increased insurance is coming and not knowing that the increased insurance has increased the moral hazard until the fire comes and destroys the property insured.

It is a good business principle to carry insurance in a sufficient amount to protect one's business, but it becomes a hazard to a city or town whenever the insured fails to carry a portion of his risk. It is the duty of every good citizen to protect his property and the property of his fellowman and whenever a hazard exists, be it moral, physical or otherwise, it is his duty to assist in causing the same to be removed, and in every locality where the people stand for good government, good citizenship and the betterment of mankind, the fire waste is small, while, on the other hand, if the citizens are for lax enforcement of the laws, careless about their citizenship and are satisfied to merely exist, the moral hazard increases and the fire waste becomes enormous.

Generally the moral hazard exists in mercantile and manufactory risks, but of recent date it has extended into the farm and country risks, and the part this risk is playing now has become alarming. Unless the good citizens who pay the bills take the matter in hand and see that laws are passed which will protect the general public against this feature of the moral hazard by causing the cancellation of over-insurance and the dismissal of agents that wilfully continue the practice of over-insurance, the fire fiend will continue to lay in ashes millions of dollars' worth of property each year. The reduction of the moral hazard is within the hands of the people and its reduction can come only through the efforts put forth by the people. While a moral hazard will always exist, it can be reduced to just such an extent as the people of the locality desire.

METAL FOR FIRE PROTECTION.

No. 52 —When it is desired to protect wood against the action of heat or flame the most general practice is to case the wood in sheet metal or interpose a sheet metal shield. The result aimed at is complete protection, a result unfortunately far from being realized in a large proportion of instances.

This needless proportion of failures may be set down to ignorance in the main, lack of knowledge of the nature of heat and its action, of various metals and their peculiarities and the proper methods of application to be followed to secure the best results, methods which must vary according to conditions.

The precise qualities that fit a metal for use as a protective covering are ductility, tenacity, high conducting power and high power of radiation, a high fusion point and incombustibility up to a fairly high temperature. It must bend without breaking, stand the strain of expansion and contraction and of much rough usage, and be able to dispense heat rapidly.

Heat is merely a mode of motion, a very high rate of vibration usually set up by what we term combustion, that is, the rapid and violent combination of some so-called combustible substance with oxygen, a series of vibrations communicated by contact or proximity to all substances in some degree. Substances that receive these vibrations at one point of a mass, transmit them rapidly to the remainder, are heat conductors and to a degree incombustible, and if these substances possess in a correspondingly high degree the power of again communicating their vibrations to the air or some other substance the action is termed radiation, and the resistance to combustion is more pronounced.

It is not necessary that a metal or other substance, to be useful for fire protection, should be actually incombustible, that is, incapable of oxidization (combustion is merely rapid and violent oxidization), but merely that its rate of radiation and conduction be high and that it have a high fusing point, with the qualities mentioned.

The metals most commonly used are zinc and iron. Zinc has good conductivity and fair radiation and, while polished, considerable power of reflection; its fusing point, however, is low, not much above the ignition point of soft woods. It is likely to be or become brittle, and it ignites and burns at a temperature below that reached frequently in moderate fires (about 1900° F.). Zinc, therefore, except for places where the heat is very moderate and the rate of corrosion an important factor (zinc oxidizes very slowly in air), such, for instance, as a floor covering under household stoves and the like, is rarely if ever a suitable metal to employ.

Iron, however, which is strong, bends without breaking, conducts rapidly and radiates powerfully, and has a very high fusing point, so high that for practical purposes it may be considered as incombustible, is particularly suitable. Its drawback is its liability to corrosion (in reality oxidization or slow combustion), requiring it to be plated with a thin coat of tin or zinc or kept painted.

If we take a plate of iron, say, four feet square, and subject, say, a central area of one square foot to heat of 500° the heat is taken up and carried to the rest of the sheet as fast as applied, so that the area of one square foot will not become heated to 500° until the entire sheet (or practically that) reaches that temperature. This is conduction.

This would soon happen were it not that, as soon as this conducted heat passes beyond the central area and to a point where the temperature of the air in contact is lower, the surplus heat is given off rapidly to the air, and the process of heating the sheet to a uniform 500° retarded. This is radiation, and this radiation always follows the line of least resistance. Bright iron, or that coated with tin or zinc, also reflects heat to some extent. It, however, is a temporary quality, partly because the polish is destroyed by moderate heat, and the tin or zinc plating melted off easily, but chiefly because no substance reflects all of the heat it receives and the excess accumulates so that the power of reflection acts merely as a retardent.

This retardent action is offset by diminished radiation (bright surfaces radi-

ate little) so that tin plating or galvanizing may be regarded entirely as devices for preventing or retarding corrosion (rust) and not as adding to protective power, but rather in some cases detracting somewhat from it. In fact, where considerable radiating and conducting areas are desired from a comparatively small area of rather intense applied heat, tin or zinc plating is undesirable and black paint is most effective.

We are employing this metal covering to protect wood, a substance that has slight powers of conduction and radiation and therefore accumulates applied heat very rapidly at the point of application until the point of combustion is reached; that is to say, we are interposing between the source of heat and this combustible wood a fire resisting substance that possesses in a high degree certain qualities not possessed by the wood.

But, if iron is to conduct heat away, it must have some place to conduct it to, and it is evident that if heat is applied upon one side of a sheet of iron over its entire area the only place it has to radiate that heat is the other side of the sheet, so that, in fact, the heat actually merely passes through the metal. Hence we must act upon several theories in application.

When we build a standard firedoor we are laying upon the wood a sheet of metal to be exposed to heat over its entire area, and we know that all of the heat it receives will simply be transmitted and thrown against the wood backing. We, therefore, make our iron casing continuous by means of locking joints and make the enclosure complete in order to exclude as much air as possible, so that the wood will speedily be carbonized without combustion.

In this case the iron is used because it is bendable and strong, resisting combustion, not in anywise to shield the wood from heat. The tinning is mainly protection from rust to secure durability.

If we are protecting, say, a wainscot from a stove, it is manifest that some other quality of the iron is the factor of value. In this case the qualities of conduction and radiation are demanded, and if the metal covers a sufficient area and the stove is not too hot or too close the protection is effective. As a matter of fact the radiating area in such cases is many times the heat receiving area and unless the applied heat exceeds 350° (that is, unless it is only enough in the intervening space to ignite a parlor match if held there) there is little occasion for an air space. If the heat is over 350°, or the area of applied heat exceeds one-quarter of the total area of the iron, an air space should be provided, with free ventilation at top and bottom, at least one inch below for 400° and an additional half-inch for each 100° of excess (1½ inches at 500°, 2 inches at 600°, etc.). The supports for such a metal shield should *always* be of metal and the heat should be gauged at its highest point, not the average of the area of applied heat.

Remember that we are planning to carry away the heat by radiation either from the front of the iron or from the reverse side in addition, in the latter case by radiating into an induced air current.

This principle applies to overhead protection. If we are protecting a ceiling above a smoke pipe twelve inches in diameter, a strip of metal twelve inches wide is of very little value, but a strip three feet wide is of very great value, and one five feet wide is sure to be thoroughly effective, but the need of an air space begins earlier, because horizontal air currents are not set up, and at least 100° allowance should be made.

It is very important also that the metal be continuous. Lockjointed metal is continuous for all practical purposes. Lap jointed metal is not, and metal protection against fire should never be applied in that manner. Lap joints on horizontal work have another defect; the spring of the metal opens the joints and permits an accumulation of dust on the upper surface.

When this ignites (it usually does sooner or later) it is necessary to remove the iron, so that the metal, while failing to protect, has had an adverse effect by, first, preventing early discovery and, second, by retarding or (often) preventing measures for extinguishing. Therefore, metal roof or ceiling protection should

always follow the contour of the wood, in and up between joints or timbers, not across them, and all joints should be lock joints.

To secure this requires usually personal supervision. Mere specifications will be disregarded usually, because no artisan is more tenacious in the matter of having his own way and of following what he considers the easiest way than the tinner, and wherever this individual is in question eternal vigilance is the price of success and safety.

The improper use of tin finish above wood boxing about recesses cut in sheathing about funnel holes is often a source of trouble. In one instance of this sort a recess sixteen inches square was cut in sheathing and all of the area so exposed about the ten-inch funnel hole finished in plaster, applied directly to the brick chimney. Next the edges of the recess were finished by inserting a boxing of three-quarter-inch wood, closing off the space between sheathing and chimney and the boxing covered with flat tin, thus exposing a flat, tin-covered shelf of light wood clad in tin three inches above, below and to each side of pipe. Eventually the top of the boxing carbonized behind the tin and took fire. The tin only served to conceal the progress of carbonization, to prevent early discovery and retard extinguishment.

Of course, three inches was too close; six inches would have delayed the ignition but probably would not have avoided it.

This funnel recess was a case of a high degree of heat applied over the entire area of the metal, a condition in which metal protection can never be applied successfully, and never should have been attempted. A boxing of asbestos lumber or similar incombustible and none conducting material should have been used instead.

In many cases of considerable heat air cell asbestos fire board can be used effectively. One inch of this is an effective protection against severe heat, but its perishable nature requires further protection by metal. Ordinary asbestos paper or any insulator less than one-half of an inch in thickness is of very little or no value.

The design of this article has been to point out the relation that should exist in protective metal between heat receiving and heat dissipating areas. In connection with this it may be remarked concerning stove pipes passing through partitions that the principles stated emphasize the need of thorough ventilation in the collars and of full six inches margin about the pipe and the enclosure of pipe and collars in an outer thimble passing entirely through floor or partition, or, if an opening of a single plate is used, at least twelve inches larger than the pipe diameter with all hollow spaces closed off with incombustible material.

It must be remembered also that wood "carbonizes" at a point considerably below the normal temperature of ignition and dessicates at a still lower temperature and that dessication and carbonization not only lower the temperature at which the wood will ignite but serve to further reduce its already limited powers of conduction, thus permitting accumulation of heat to proceed more rapidly.

So it happens that wood, dessicated or carbonized at a given temperature, will ignite upon application of a moderate increase of heat, especially in a situation where free radiation is interfered with, this point being very much below the ignition point of new and exposed wood.

Metal protection applied carelessly may serve to increase rather than mitigate the hazard.

❦ ❦ ❦

**No. 53** HAZARDS IN GARAGES.—While visiting friends in a small town recently, the writer, on invitation of the fire chief, had the opportunity of seeing some of the fire hazards of the town. It will be unnecessary to mention any names, but this small place is just like all other small towns without a thought of fire prevention.

The chief took me to a one-story concrete public garage. The first thing that I noticed was the cement floor, which was the same as my own city's standard. The place was clean, except for a few wooden boxes which were of no use, but it was crowded with automobiles, and

there was only one way out. After winding my way through the narrow spaces between the machines, I found the gasoline pump alongside the wall and about in the centre of the garage. Near the pump were three five-gallon cans filled with gasoline. I suppose these cans were filled and left standing so a customer would not be delayed long while having his gasoline tank filled.

In the rear of the garage were three pits. These are openings in the floor into which men go to repair parts of automobiles which they cannot reach otherwise. One pit was being used and the others had wooden covers on. Gasoline vapor is very thick in pits and rubbish is very apt to accumulate in them to the danger of spontaneous combustion.

About six feet from the pits and in the corner was the entrance to the boiler room where the heating plant was housed. The opening was from the garage proper to a sub-cellar without even a firedoor on upper or lower landing. The floor of the boiler room was about ten feet below the garage floor. A strong odor of gasoline was apparent.

When asked for my opinion on this boiler room, I suggested that the entrance opening be cemented over and an outside entrance provided. There were no signs to prohibit smoking, but, as it so happened, nobody was smoking.

We went next to another public garage, which consisted of two buildings—a one-story frame and a one-story cement block building. As we entered the frame section, a 100-gallon tank of gasoline confronted us about five feet from the entrance doors, propped up on wooden horses. It had a faucet under which hung a two-gallon open can. A man was working on an automobile in the rear and was smoking a pipe. Two stoves were on one side of the garage but fortunately were not being used at the time, although there was a small heap of ashes in front of them. The pipe from the stoves was inserted in the wooden side wall without any protection whatsoever.

In the adjoining cement building there were many cars. On the side near the frame garage were three windows, two of which contained ordinary glass and the other was open without any glass. This window was used as a sort of passageway for tools and parts of automobiles, etc. Should a fire occur in either garage, it would undoubtedly spread rapidly to the other through these windows. No gasoline was stored in this building, as they obtained it from the 100-gallon tank next door. The boiler room was in a separate cement block enclosure off from the rear, with the only entrance from the garage. Not even a firedoor separated them. As they intended to build an addition in the rear of the garage, I suggested that a firedoor be placed between the new and old parts so that a fire in either part would not damage the other.

We had to pass through a rear yard on our way out from the garage, and on

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*To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of $10.00 and one second Prize of $5.00 for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The work and efficiency of public fire departments, fire prevention bureaus, and private fire brigades present many important subjects for discussion.*

*Short, practical articles are wanted on every subject that will prove of value to firemen (public or private), and to inspectors and others interested in The Fight Against Fire. Articles may cover methods and practices relating to fire fighting and fire prevention by public departments, faults of construction that create fire perils, the fire hazards of processes that endanger life and property, how firemen and public inspectors may qualify themselves for advancement, the character and use of apparatus and other equipment, private fire brigade organization and drill, employes' exit drills, regulations and requirements of all kinds, etc.*

*In passing upon the articles submitted, the Committee to Award Prizes will be influenced, in each case, by the evidence an article gives of its writer's knowledge of and interest in fire prevention or fire extinguishment, in general, and by the practicability and adaptability of the writer's suggestions and ideas.*

*Articles will be received from any person competent to discuss the question of fire prevention and fire extinguishment. Contributions are especially invited from members of city fire departments and fire prevention bureaus, members of well established private fire brigades, insurance engineers and others. Articles should not exceed the limit of 800 words. No consideration of any kind is required for the privilege of competing.*

*Drawings, sketches and photographs may be submitted whenever they will aid or supplement the texts of articles.*

*Blanks upon which to submit articles for this department of SAFETY ENGINEERING will be furnished on application. But any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

the way I noticed a small shed, containing two 60-gallon tanks of gasoline. A short distance away were the remains of a bonfire. When told of the dangers of storing gasoline above ground and of building bonfires, the owner of the premises seemed very willing to heed my recommendations.

An automobile salesman called us into his store and asked about the burial of a gasoline tank. His intention was to put up a pump with light attachment on the curb. These arrangements are advantageous to business when on the curb line, but it is no place to conduct a private business as the space belongs to the authorities, not to the resident. There is also the danger of the pump being broken off. There seems to be no objection to these signal box pumps on private property.

There are probably hundreds of just such instances, as the few mentioned in this article, in all small towns, because there is no supervision over the dangers of fire and the prevention of fire.

If someone had been appointed as fire marshal for small towns about 15 or 20 years ago, there would not be such large fire losses in the cities of the present day. When towns are in their infancy is the time to act in the cause of fire prevention; results would be apparent in the future city.

## PRIZES FOR MARCH ARTICLES.

*First Prize. No. 48. Richard H. Borden, Jr., Fireman, New York Fire Department, Engine Company No. 4, New York City.*

*Second Prize. A Tie. Nos. 47, 49, and 50. C. W. McKeehan, Secretary, State Fire Marshal, Oklahoma City, Okla. J. William Morgan, Deputy State Fire Marshal, Harrisburg, Pa. Harriet Henderson, Manton, Mich.*

## COMMENTS BY MEMBERS OF THE COMMITTEE.

I cast my vote for No. 48, based on his knowledge of lumber yard conditions. The suggestions are complete and within reason and should be adopted by those who are interested in the protection of their plants. Evidently the writer has had experience in this work. His article dwells on one of the most hazardous and dangerous conditions that exist, and every prevention and precaution mentioned should be followed.

No. 50 selected a subject that covers a fire hazard affecting a large valuation in both private and national resources. Fire prevention, efficiently carried out, is surely the first consideration covering a property of this kind, which involves such large value, especially in view of the fact that the facilities for extinguishment are necessarily very meager. The writer has brought forward some excellent methods and suggestions for preventing and combating fire of this nature. I cast my vote for No. 50.

No. 49 for first prize. Education is truly the foundation of fire prevention. "The child is father to the man" and the necessity for fire prevention will be as great twenty years from now as it is today. If the children are properly educated in this regard a big step forward will have been made.

I cast my vote for No. 48. The writer deals with fire prevention and fire protection, and has made his ideas and suggestions very practicable and adaptable.

In voting for No. 47 I have clearly in mind the thought that, although I have been a householder for twenty-five years, a number of the points brought out relative to spontaneous

# QUESTIONS AND ANSWERS

*Subscribers to* SAFETY ENGINEERING *are invited to ask questions on any phase or problem of fire prevention or fire protection. This includes construction and equipment of buildings, installation and use of appartus, fire dangers peculiar to industries, etc. Questions received will be published each month, with request for replies by engineers, inspectors, officials and others interested in the subjects presented. If too long for publication, replies will be forwarded by mail direct to the inquirers. It is believed that, by this method, subjects on which there is a desire for special information will be developed. It will also put the authors of articles in touch with inquirers who wish further information on points merely touched upon or not made wholly clear in published articles.*

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**I will be under obligation to the author of Article No. 47, published in the March number of SAFETY ENGINEERING, if he will reply through the new Question and Answer department as to the conditions required to produce spontaneous ignition of sulphur (pure sulphur being understood, not sulphurets).**

**As the Provincial Association of Fire Chiefs of Ontario is to discuss the following topics at its convention in Ottawa in August, I suggest that they are appropriate subjects for articles in SAFETY ENGINEERING. Responding to your invitation in the March number I offer these questions for discussion by contributors to "The Fight Against Fire":**

1. **Practical efficiency of motor fire apparatus in winter, under all conditions.**
2. **Fire prevention and fire extinguishment in basement and cellars.**
3. **Proper safeguarding of the lives of inmates of public institutions and their protection from fire.**
4. **Electric installations and their relation to the fire waste.**
5. **Fire prevention, its enforcement and the need of education along fire prevention lines.**

combustion have hitherto escaped my notice. I presume that nearly everyone is informed as to the danger from oily rags, but I question whether there is not a great deal of ignorance even in this day and generation concerning the possibilities of spontaneous combustion in the householder's coal pile.

❦ ❦ ❦

I vote for No. 49 on the ground that the subject is the most vital topic treated in the March issue, a subject upon which too much cannot be said. "It is hard to teach an old dog new tricks," but many a care-hardened old sinner has succumbed to the influence and example of the younger brood and (perhaps, unconsciously) mended his ways. Keep it up until every school in every town gives regular instruction.

No. 47 deserves mention. Incidentally I would be under obligation to the author if he will reply through the new question and answer department as to the conditions required to produce spontaneous ignition of sulphur (pure sulphur being understood, not sulphurets).

❦ ❦ ❦

I am of the opinion that article No. 48 is the best because it covers a great hazard in a large city where lumber yards are numerous, also the additional hazard of the second-hand lumber yards which are springing up all the time due to the tearing down of buildings to make room for the modern fireproof buildings to which the principles of this article apply also.

❦ ❦ ❦

I think article No. 50, entitled "Efficiency in Fire Protection," is very good. Taking care of and preventing serious forest fires in wooded countries is very important. It is a subject covering the preservation of our

natural resources. The article is impressive to those who have seen forests which have been destroyed, miles upon miles of mighty trees burned to the ground, and mountains swept clean of millions of dollars worth of lumber. I vote for No. 50.

❦ ❦ ❦

I cast my ballot for article No. 47 because of its strong points in reference to the danger that lurks through the ignorance of the causes of spontaneous combustion of substances. The paragraph that relates to the combustibility of soft coal, and the careless storage of the same, gives a warning to those who handle this fuel and who never stop to think of its self-ignitible propensity.

## BOOKS.

FIRE! PREVENTION OF FIRE. THE BEST CONDUCT DURING FIRE. Issued by the City of North Yakima, Wash.

A 16-page pamphlet dedicated to the school children of North Yakima. Among the subjects treated are: Safeguarding the Home from Fire, Prevention Is Easy, Cleanliness Essential, Matches and Smoking, Safeguarding the Lights, Fire Protection, Heating Hazards, Gasoline Explosives, The Family Garage, Holiday Fire Warning, When the House Takes Fire to Save Yourself.

LEAD POISONING IN THE MANUFACTURE OF STORAGE BATTERIES. Bulletin No. 165, Industrial Accidents and Hygiene Series No. 6. Thirty-eight pages. Eleven illustrations. United States Department of Labor, Bureau of Labor Statistics, Washington, D. C.

The making of storage batteries is increasing in extent and importance. It is regarded as a very dangerous lead trade. In the United States there are five large factories where storage batteries are made. One is in Cleveland, Ohio, another in Depew, N. Y., another in Suspension Bridge, N. Y., and two in Philadelphia. Smaller plants are scattered throughout the country. Some automobile factories have their own storage battery departments.

The author of the bulletin, Alice Hamilton, M. A., M. D., divides her text under six headings. First is an introduction in which types of storage batteries are described. Processes in the Making of Storage Batteries; Hygienic Conditions; Wages, Duration of Employment, etc.; Lead Poisoning in the Industry, are chapter headings. The concluding chapter is a summary. In appendices are the regulations of Great Britain and the general provisions of the French law governing the manufacture of storage batteries.

LECTURES ON FIRE INSURANCE. Season 1913-1914. The Insurance Institute of Hartford.

Contains short papers on Building Construction, Common Fire Hazards, Hotels and Lodging Houses, Woodworkers, Fire Protection, The Standard Policy.

LIVE ARTICLES ON SPECIAL HAZARDS, No. 6. The Weekly Underwriter, New York. Price $1.05.

Contains articles on Crude Oil and Oil Refineries, Gasoline, Naphtha and Benzine, The Insurance Engineer, Reinforced Concrete Construction, Celluloid Factory Fire, and other subjects.

BUREAU OF EXPLOSIVES. Report No. 8 of the Chief Inspector, New York City.

This report to the executive committee of the Bureau for the Safe Transportation of Explosives and other Dangerous Articles relates to the work of the bureau during 1914. The table of accidents in the transportation of explosives, 1907-1914 inclusive, indicates the success of the bureau in working for the single purpose of promoting the safe transportation of explosives.

## TEN CENTS FOR SAFETY.

The manager of a branch factory in Rochester related an incident to prove that "it pays to be safe." He suggested to the Buffalo manager of the company that a simple safety device, one of his own inventions, be installed in the plant. The Buffalo manager did not consider the suggestion worthy of being followed. A week later an accident occurred in the Buffalo plant and the manager received a serious cut above the eye. The cost of the safety device was ten cents!

## WHERE GOGGLES WERE A SAFEGUARD.

It is betting on a sure thing that the man shown in the picture will not object to wearing goggles, and that he will insist on all men, working under him, wearing them also. He is foreman in a Buffalo moulding shop.

One of his moulders placed a damp skimmer in a ladle of hot metal, with the

Courtesy of the American Car and Foundry Company.

**Eyes Saved by Goggles.**

inevitable result that the metal exploded, and was thrown on his face, neck and head. The goggles saved his eyes. Note the metal on the glass and the burn under the man's right eye.

This is also a lesson in teaching the danger of placing any implement, on which there is the least trace of moisture, into a vessel filled with hot metal.

## WHAT WORKMEN CAN DO.

"Safety First" is not a question of dollars and cents; it is a question of saving human life, the most valuable thing in the world which, when once gone, can never be brought back, says a bulletin of the Chicago & Northwestern Railway Company. It is trying to save men from losing their legs and their arms, which never can be replaced. It is trying to save the making of widows and orphans, destitution and misery. Neither the officers nor the laws can do it. But the workmen can do it, if they try. Think this over—and then TRY.

## PUBLIC SAFETY BULLETIN.

The *Public Safety Bulletin,* official publication of the Public Safety Commission of Chicago, and of Coroner Peter M. Hoffman, of Cook County, Ill., has appeared in new form. The bulletin announces that its aim will be to present the safety side of accidents and to educate the people on accident preventives.

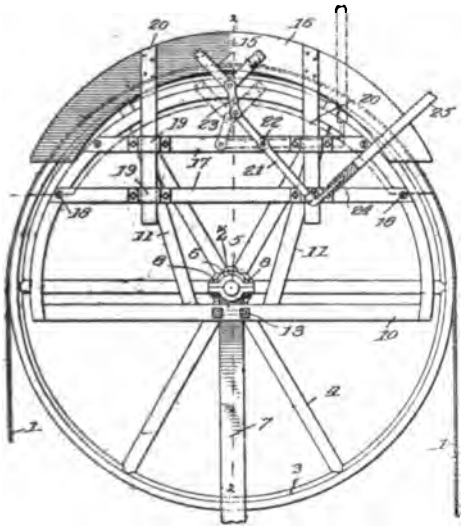
## SAFE WHEELBARROW.

That such an innocent looking contrivance as a wheelbarrow is responsible for a great number of painful accidents hardly seems plausible to the layman not conversant with the facts. The accompanying illustration, reproduced from the February *Bulletin* of the National Founders' Association, indicates the necessity of proper construction and care of wheelbarrows to the same degree of the rest of the equipment of a manufacturing plant.

**Knuckle Guards on Wheelbarrow Handles.**

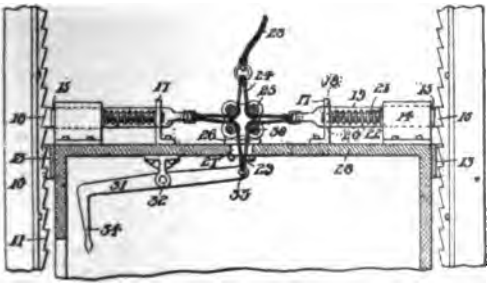
# RECENT INVENTIONS OF SAFETY DEVICES

SAW-GUARD FOR BAND-MILLS. August Isaacson, Marshfield, Ore.



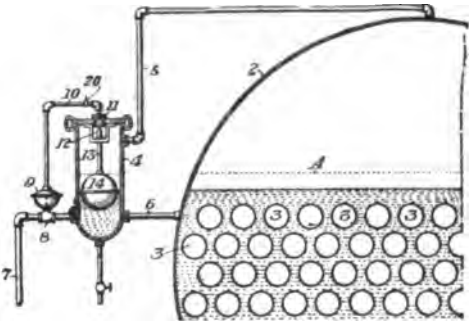
A device of the character specified, in combination with the band wheel and the standards supporting the same, of a supporting member arranged on the side of the band wheel adjacent to the teeth of the saw, said member comprising an arc-shaped plate and a bar connecting the ends of the plate, and braces arranged between the plate and the bar, said bar being secured to one of the standards, cross bars arranged transversely of the supporting member and approximately parallel with the bar and secured to the plate, and an arc-shaped guard plate arranged at the outer edge of the first-named plate, guide arms secured to the said plate and extending inward in parallel relation, guide bearings for the arms secured to the cross bars, and means for moving the said plate inwardly and outwardly, said means comprising a lever pivoted to one of the cross bars, a link connecting one end of the lever to the arc-shaped plate, and a catch for engagement by the lever to hold the plate in extended position.

SAFETY DEVICE FOR ELEVATORS. Andrew Barash, Glouster, Ohio.



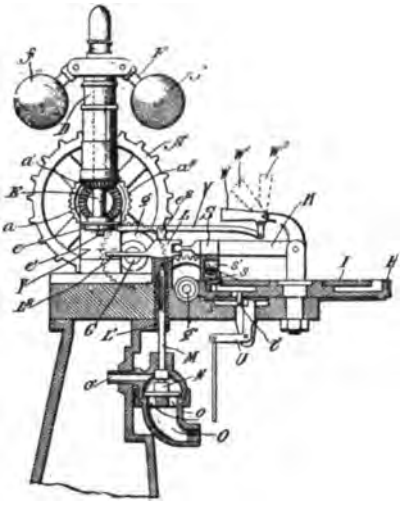
In combination with an elevator shaft having oppositely-positioned toothed racks and a car vertically movable therebetween, of oppositely-positioned strap brackets upon the roof of said car, outwardly projectable bolts slidably-mounted within said brackets, guide plates positioned inwardly of said brackets and each provided with a rectangular central perforation and oppositely-positioned circular perforations, said bolts provided with a central inwardly-extending arm and with oppositely-positioned inwardly projecting pins adapted for sliding reception within the perforations of said plates of corresponding dimensions, expansion springs surrounding said pins and engaging between said plates and bolts, a bracket centrally-positioned upon the roof of the car, rollers mounted in said brackets, a hoisting cable, cords secured between the lower end of said cable and the inner ends of said bolt arms a pivoted lever within said car provided with an operating handle, the roof of said car provided with a central opening therethrough beneath the said bracket, and connecting cords extending through said roof opening and secured between the inner end of said lever and the inner ends of said bolt arms.

SAFETY DEVICE FOR BOILERS. Daniel J. Duggan, Everett, Wash., assignor of one-half to Sylvester Cropper, Lowell, Wash.



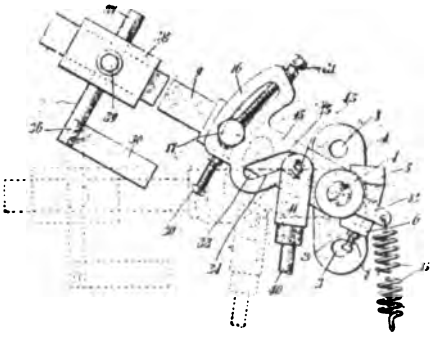
A safety device of the character described, comprising means for controlling the consumption of fuel in a boiler furnace, a float chamber extending above and below the normal water level of the boiler, a float within said chamber, there being connections between said float chamber and the boiler, a pipe leading to the furnace chamber of the boiler, a valve in said pipe, a diaphragm chamber, a diaphragm in said chamber, actuating connections between the valve and the diaphragm, a pipe leading from the diaphragm chamber to the steam space of the float chamber, and a valve controlled by the float arranged to open communication between the steam space of the float chamber and the diaphragm chamber; substantially as described.

SAFETY ATTACHMENT FOR HOISTING MACHINERY. George F. Royer, Wilkes-Barre, Pa.



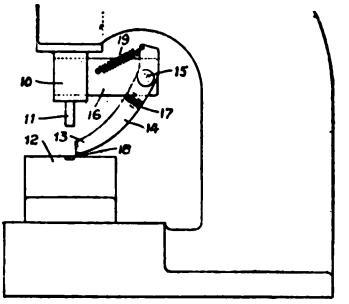
In apparatus of the character described, the combination of a power shaft, fluid pressure mechanism controlling movement of said shaft, a valve controlling operation of the fluid pressure mechanism, an actuating device for said valve connected with the shaft and movable to and from operative relation to the valve as the speed of the shaft varies, a member connected with the valve and adapted to be engaged by said actuating device if the speed of the shaft exceeds a predetermined limit at any time, and means for adjusting said member relative to the valve and actuating device to effect movement of the valve when the shaft has completed a predetermined number of revolutions.

SAFETY DEVICE FOR POWER STAMPING PRESSES. Theodore Kreipe, Floral Park, N. Y.



In a safety device for power presses and the like, the combination with a movable gate bar provided with a part having a substantially horizontally disposed shoulder, provided at one end with an angularly disposed face, a safety gate carried by said gate bar, a connecting device adapted to be connected with a movable operating part which controls the operation of the press, said connecting device having an actuating part for engaging the shoulder and effecting the movement of the gate into operative position, said actuating part normally lying above said shoulder but movable longitudinally of the same, to permit it to pass off of said shoulder, at the junction of said angular face therewith, when the gate has been fully moved to operative position and permit the further movement of the operating parts, and means for restoring the parts to normal position.

SAFETY ATTACHMENT FOR PRESSES. William A. Hancock, Seymour, Conn., assignor to the Seymour Metal Goods Company, Seymour, Conn.




The combination with the punch carrier and die block of a press, of a guard normally lying back of the line of movement of the punch and resting on the die block, a lever by which said guard is carried and an arm extending from the punch carrier to which the lever is pivoted, downward movement of the punch carrier causing forward movement of the guard, the guard clearing the punch and the downward movement of the latter continuing behind the guard.

## FIRE PREVENTION IN CHICAGO.

The Committee on Publicity and Education, 160 West Jackson Boulevard, Chicago, is putting out forceful literature on fire prevention. Bulletin No. 13 Inter-Insurance Information, together with other pamphlets gives facts and figures on fire losses and emphasizes the necessity for a national co-operation in fire prevention. Articles have been published on the following phases of the fire hazard:

Personal responsibility for fires.
Credit men on insurance rates.
Eighty per cent of fires preventable.
Fire insurance taxation.
"Safety First" and fire prevention.
Fire prevention day demonstration in Chicago.

The present safety movement can only be understood when it is considered as a part of the general efficiency movement which is attracting such wide attention among manufacturers all over the world.—*C. M. Price.*

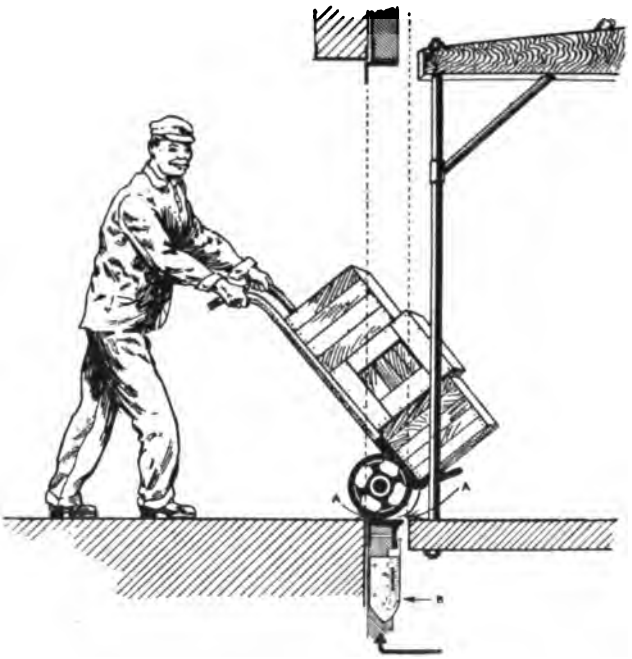
# MATERIALS, APPARATUS, PROCESSES

## FREIGHT ELEVATOR DOORS THAT SAVE SPACE, TIME LIFE AND PROPERTY.

The Peelle Company, 123 Liberty street, New York, has been awarded the contract for freight elevator doors in the buildings of the Thomas A. Edison, Inc., plant, West Orange, N. J., these largely used doors having been selected, among other reasons, on account of the safety against the spread of fire they afford; this being due to the fact that the doors make each floor an individual fire unit.

It will be remembered that this plant had a fire early in December, 1914, which swept through its buildings and concerning which an article appeared in SAFETY ENGINEERING for December. In reconstruction, Mr. Edison decided that every precaution should be taken to prevent the repetition of such a disaster. In purchasing freight elevator doors he chose those which would prevent the spread of fire and render safe, satisfactory service.

**Accidents like the one above are prevented by "Peelle" doors.**



**The patented feature of the "Peelle" Freight Elevator Door makes trucking easy and safe, as shown by picture on the right.**

In addition to the points mentioned, "Peelle" doors close the entire opening, thereby preventing accidents; do not obstruct any floor space, and, it is claimed, increase elevator efficiency about 50 per cent. No other freight elevator doors present a neater appearance than the "Peelle," as they are made to harmonize with the finest surroundings.

Freight-handlers and others have been injured seriously by the throwing of heavy merchandise, etc., from trucks that passed over the open spaces between the floors of freight elevator cars and the floors of buildings. That accident-breeding condition is also avoided entirely where "Peelle" truckable, counterbalance doors are used for freight elevator openings.

The trucking feature of the "Peelle" door rests on solid, adjustable stops, relieving all weight from the chains on the door when opened; thus a smooth, solid trucking sill is formed by the upper edge of the lower door, and all chance of accident, like that mentioned in the foregoing paragraph, is eliminated.

"Peelle" freight elevator doors meet the modern demand for greater safety to operators and passengers riding on elevators equipped with heavy fireproof doors, and they are the result of years of experience and inventive skill.

A large number of installations of "Peelle" doors has been made, and the doors are giv-

ing satisfactory service and affording safety and efficiency in prominent buildings throughout the country. The freight lifts of the Equitable Building, New York, are equipped with them, and a few of the many other modern buildings in which "Peelle" doors and "Peelle" service are appreciated are those of the Otis Elevator Co., Hill Publishing Co., United States Rubber Co., and Peerless Motor Co., New York; Bush Terminal and New York Dock Co., Brooklyn; General Electric Co., East Boston, Mass., Harrison, N. J., and Ft. Wayne, Ind.; Ford Motor Car Co., Long Island City, New York, Houston, Texas, Columbus, Ohio, and in other cities; Eastman Kodak Co., Rochester; American Can Co., Baltimore, and National Electric Lamp Co., St. Louis, Mo.

"Peelle" Doors, Hill Publishing Co. Building, New York.

**"Peelle" elevator doors would have kept the fire from spreading to upper floors in the building shown above and other buildings of the Edison plant. "Peelle" doors will be installed in reconstructed buildings of this plant.**

## WORLD'S INSURANCE CONGRESS.

The latest and one of the most important of the developments in the plans for the World's Insurance Congress, October 4 to 16, at the Panama-Pacific International Exposition, San Francisco, is the appointment of an Advisory Committee, which is to have charge of the preparation of the programme for that occasion.

Members of the committee:

Allison, Young E., editor, *The Insurance Field*, Louisville.

Bissell, R. M., president, Hartford Fire Insurance Company and Hartford Accident & Indemnity, Hartford.

Barnaby, W. S., editor, *Spectator*, New York.

BroSmith, William, counsel, Travelers Insurance Company, Hartford; ex-president, International Association of Casualty & Surety Underwriters.

Cartwright, C. M., editor, *The Western Underwriter*, Chicago.

Cox, Robert Lynn, general counsel and manager, Association of Life Insurance Presidents, New York.

Craig, J. M., actuary, Metropolitan Life Insurance Company; president, Actuarial Society, New York.

Diggs, W. S., president, Insurance Federation of Ohio, Cincinnati.

Dexter, George T., vice president, Mutual Life Insurance Company, New York.

Dryden, Forrest F., president, Prudential Insurance Company, Newark.

Evans, Henry, president, Continental and Fidelity-Phenix Fire Insurance Companies, New York.

Fetzer, Wade, ex-president, National Association of Casualty & Surety Agents, Chicago.

Holcombe, John M., president, Phoenix Mutual Life Insurance Company, Hartford.

Lott, Edson S., president, United States Casualty Company, New York; ex-president, International Association of Casualty & Surety Underwriters.

Lippincott, Henry C., manager of agents, Penn Mutual Life Insurance Company, Philadelphia.

Powell, Henry J., manager, Equitable Life Assurance Society, Cincinnati; ex-president, National Association of Life Underwriters.

Putnam, Henry H., secretary, National Association of Insurance Agents, Boston.

Reynolds, J. B., president, Kansas City Life Insurance Company, Kansas City, Mo.; ex-president, American Life Convention.

Snow, E. G., president, Home Insurance Company, New York.

Sturhahn, Carl F., manager, Rossia Insurance Company, Hartford.

Van Buskirk, M. F., editor, *Fraternal Monitor*, Rochester.

## EFFICIENT MACHINE GUARD.

The safety guard fitted to a 42-inch Bullard boring mill which is shown in the accompanying illustration was designed and constructed by the foreman of the machine shop of the Norton Company, manufacturers of "Alundum" and "Crystolon" grinding wheels, Worcester, Mass.

**Convenient and Effective Guard For a Boring Mill**

This guard illustrates the principle which should be embodied in every guard that cannot be secured permanently over the dangerous part of a machine. In this case the part to be guarded was the revolving table. When the work is being secured to or removed from this table it is necessary that all parts be accessible easily. A stationary guard would be in the way and an ordinary hinged or sliding guard would be left open usually, depending entirely on the carefulness of the operator.

The guard illustrated is designed so that when the machine is at rest it is lowered out of the way, but when the shifter is moved over to start the machine the guard is pulled automatically into place. When the machine is stopped the guard is lowered by the same means and no time is wasted.

## AUTOMATIC SPRINKLER PROTECTION.

"Safety From Fire" is the title of an instructive illustrated book issued by the "Automatic" Sprinkler Company of America, 123 William Street, New York. A book that should be read by everyone interested in securing safety from fire.

Attention is directed to the fact that the fire tax, that is, the aggregate of the amount of the fire waste, the cost of indemnity and defense and the losses from interrupted business for the year 1914 was $655,000,000, and that in 32 years it has cost $17,000,000,000. In the period more than 50,000 lives have been sacrificed in fires, and the annual loss of life through fire is between 1,500 and 2,000, thousands of other persons being maimed, scarred and disfigured each year.

The method adopted by the owners of cotton mills to protect their factories and their employes is shown. How well this has been accomplished is shown by the fact that, though next to making gun powder, making cotton into fabrics, without the stuff burning up—burning is very slow explosion—is the most ticklish job in the world, one seldom hears of a loss of life by fire in a cotton mill, though fires occur more frequently in such mills than in any other industry, the automatic sprinkler being the solution of these seeming contradictions. The automatic sprinkler has made man's first factory, the cotton mill, into man's safest factory—the modern textile mill; has reduced premium rates on cotton mills by more than 85 per cent and made them today the lowest fire insurance rates in the world.

Automatic sprinkler systems are doing

**A Safe Method of Securing Safety for The Gillette Safety Razor Plant, Boston, Mass.**

similar work in all lines of manufacture, not excluding the metal industry, and they render an assurance that money cannot buy—the prevention of the interruption and demoralization of business. The Ford Motor Company, for instance, will not do business with concerns having sprinklerless factories. Mr. Ford takes no chances on interruptions by fires, and his plant is sprinklered to the last square foot.

That open sprinklers are certain means of safeguarding buildings from fires which originate and gain headway in other structures in the neighborhood is shown in the picture of open sprinklers drenching windows in the plant of Gillette Safety Razor Company, Boston. The screen of water saved the factory from a threatening fire in an adjacent building. The superintendent of that factory asserted that it was "impossible for the fire to penetrate even the sashes or windows."

**Storeroom of a Southern hotel in which a fire started due to spontaneous combustion of greasy cloths left on steam radiator. Automatic sprinkler, shown in picture, opened and put out the blaze.**

On the subject of the fire danger in hotels the book says that "the greatest universal corrective for the fire perils in hotels is the automatic sprinkler"; that it is in fact the silent guardian of life and property which "slumbers not nor sleeps."

A chapter is devoted to the automatic sprinkler system, rightfully acclaimed the world's greatest fire fighter, and—but send to the Automatic Sprinkler Company of America for a free copy of the instructive book. You will find it valuable.

## SAFETY FIRST FOR THE PURCHASER AND USER.

The Lockhart-Hodge Company, Inc., manufacturing "Jones Safety Guards," has introduced a new selling method in connection with the sale of the company's "Jones Safety Guards." To every purchaser it gives a bond, which guarantees to the customer the validity of the Lockhart-Hodge Company's patents, and furthermore it constitutes an agreement that the customer may have thirty days' trial of the "Jones Safety Guards" and that infringement on the guards will be prosecuted.

## EFFICIENCY WORK.

Ira J. Owen of Chicago, mechanical and consulting engineer, has joined the Chicago staff, as chief engineer, of Marwick, Mitchell, Peat & Co., chartered accountants. Mr. Owen is to have charge, personally, of the engineering work of the firm's efficiency department. His previous experience in that capacity has been such that his services will be of valuable assistance to clients who contemplate the introduction of economical and efficient methods in the conduct of their business.

## MISCELLANEOUS ITEMS.

"Some Knotty Problems in Salesmanship and How They Were Solved" was the subject of the third annual address given by Col. Eugene L. Markey, general manager of the Shur-Loc Elevator Safety Company, of Chicago, before the Y. M. C. A. class in advertising at the Twenty-third street branch, New York, recently.

The hollow metal doors mentioned in the March number as manufactured by The Kinnear Manufacturing Company, Columbus, Ohio, are a product of the Kinnear & Gager Manufacturing Company, Columbus, Ohio.

# UNDERWRITERS' LABORATORIES'

## Recent Approvals of Appliances

ACETYLENE GAS GENERATORS. "Pinnacle." Oxweld Acetylene Co., mfr., 36th St. and Jasper Pl., Chicago, Ill. Stationary automatic apparatus of carbide-to-water type, for isolated installations.

ALARM VALVE, VENTURI. Automatic Sprinkler Co. of America, mfr., 123 William St., New York, N. Y. Automatic fire alarm valve for use in automatic wet pipe sprinkler equipment.

AUTOMATIC SPRINKLER, ASSOCIATED, ISSUE "B." Associated Automatic Sprinkler Co., mfr., 2218-24 Vine St., Philadelphia, Pa.

AUTOMATIC SPRINKLER, ASSOCIATED, ISSUE "C." Automatic Sprinkler Co. of America, mf., 123 William St., New York, N. Y.

AUTOMATIC SPRINKLER, NIAGARA, ISSUE B. Automatic Sprinkler Co. of America, mfr., 123 William St., New York, N. Y.

AUTOMATIC SPRINKLER, ROCKWOOD, ISSUE "D." Rockwood Sprinkler Co., mfr., 38 Harlow St., Worcester, Mass.

CHEMICAL EXTINGUISHER, 2½ GALLONS. LOOSE STOPPLE TYPE. American-La France Fire Engine Co., mfr., Elmira, N. Y.

CHEMICAL EXTINGUISHER, 2½ GALLONS. LOOSE STOPPLE TYPE. Badger Fire Extinguisher Co., mfr., 32 Portland St., Boston, Mass.

CHEMICAL EXTINGUISHER, 33 GALLONS. MANUALLY OPERATED TYPE. Badger Fire Extinguisher Co., mfr., 32 Portland St., Boston, Mass.

CHEMICAL EXTINGUISHERS, 33 GALLONS AND 2½ GALLONS. LOOSE STOPPLE TYPE. Badger Fire Extinguisher Co., mfr., 34 Portland St., Boston, Mass.

CHEMICAL EXTINGUISHER, 2½ GALLONS. LOOSE STOPPLE TYPE. Childs Co., O. J., mfr., 50 Liberty St., Utica, N. Y.

CHEMICAL EXTINGUISHER, 1 QUART. PUMP TYPE. JUSTRITE. Justrite Mfg. Co., The, mfr., 345 S. Clinton St., Chicago, Ill.

CHEMICAL EXTINGUISHER, 1 QUART. PUMP TYPE. Pyrene Manufacturing Co., mfr., 1358 Broadway, New York, N. Y.

CONDUIT BOXES, COVERS FOR. Pass & Seymour, Inc., mfr., Solvay, N. Y. P. & S. conduit box covers for round conduit boxes.

DOOR CLOSER. Yale & Towne Mfg. Co., mfr., Stamford, Conn. Yale Door Closers. Door check consists essentially of a metal case, filled with a liquid and containing a piston and spring, and of a system of levers through which the spring acts. Means are provided for regulating the (amount of the) spring tension and the checking power of the device.

DRY PIPE VALVE, ROCKWOOD. Rockwood Sprinkler Co., mfr., 38 Harlow St., Worcester, Mass. Differential type for controlling dry pipe automatic sprinkler equipment.

FIRE HOSE, UNLINED LINEN WITH OR WITHOUT COUPLINGS. Eureka Fire Hose Mfg. Co., mfr., 13 Barclay St., New York, N. Y.

FIRE HOSE. PLAY PIPE, NATIONAL STANDARD TYPE. Eureka Fire Hose Mfg. Co., mfr., 13 Barclay St., New York, N. Y.

FIRE PAIL, 12 QUARTS. Baar Fire Bucket Co., mfr., 29 S. La Salle St., Chicago, Ill.

FIRE PAIL, 12 QUARTS. Eureka Chemical Fire Pail Co., mfr., 117 Market St., Philadelphia, Pa.

FIRE PAILS, 8, 10 AND 14 QUARTS. Fibre Corporation, mfr., 7 Leonard St., New York, N. Y.

FIRE PAIL, 12 QUARTS, WAGGONER SANATORY FIRE BUCKET. Waggoner Sanatory Fire Bucket Co., mfr., Chicago, Ill.

GAS ENGINES. "WHITE & MIDDLETON TYPE Q." Charles White Gas Engine Co., mfr., Charles and Winder Sts., Baltimore, Md. Horizontal, single-cylinder, four-stroke cycle engine.

GASOLINE ENGINES, PORTABLE. "Bull Dog" Type X. Bates & Edmonds Motor Co., mfr., Lansing, Mich. Single-cylinder, horizontal, four-stroke cycle engine.

HANGERS FOR AUTOMATIC SPRINKLER EQUIPMENTS. Automatic Sprinkler Co. of America, mfr., 123 William St., New York, N. Y. Non-Adjustable Hangers. Semi-Adjustable Hangers. Adjustable Hangers.

HEATERS, ELECTRIC. Hotpoint Electric Heating Co., mfr., Ontario, Cal. El Radio Luminous Air Heater. This heater consists of a helical wire-wound resistance element mounted on mica and supported behind a wire screen in a copper-lined sheet-metal case open at front and provided with terminals for connecting plug at back.

HOSE, GASOLENE. "Triplexd." Metal Hose & Tubing Co., mfr., 482 Pearl St., New York, N. Y. A ¾-in. flexible rubber-metal hose consisting of a double-grooved, flexible, galvanized steel inner tube with an asbestos packing, surrounded by a rubber tube and covered with a woven cotton jacket. Used to conduct gasolene.

HOSE, GASOLENE. "Regulation C." United Metal Hose Co., Inc., mfr., 510 W. 24th St., New York, N. Y. A ¾-in. flexible rubber-metal hose consisting of an interlocking, flexible copper inner tube with an asbestos packing, surrounded by a rubber tube with an outer layer of canvas, over which is woven a cotton jacket. Used to conduct gasolene.

HOSE RACK. I X L. Nuhring & Bros., Charles, mfr., 1212 Walnut St., Cincinnati, Ohio. Semi-automatic rack for use in connection with interior standpipe systems.

INSULATING MATERIALS. Westinghouse Electric & Mfg. Co., mfr., East Pittsburgh, Pa. "Bakelite-Micarta," made in plates, tubes and rods with a Bakelite binder. Grades 21-A, 21-X, 32-X, 213, 323 have a fiber body, and Grade 21-D has a cloth body. Laboratory tests show that this material has good dielectric strength, is practically non-absorptive, is unaffected by oils, can be readily worked with tools, and is somewhat less combustible than fiber.

PICTURE MACHINES AND APPLIANCES. Enterprise Optical Mfg. Co., mfr., 564 W. Randolph St., Chicago, Ill. Motion Picture Projector. Motiograph for hand operation.

PUTTY, GLAZING. Marx, John, mfr., 54-56 Paterson Ave., Hoboken, N. J. Marx Fire Window Putty. Glazing putty made of pure whiting and raw linseed oil chemically treated.

SAFETY FIRE BUCKET TANK. Safety Fire Extinguisher Co., 291-3 Seventh Ave., New York, N. Y. Approximate capacities: Tanks, 25 and 40 gals.; pails 10 and 14 qts.

SIGNAL APPLIANCES. American Model & Instrument Co., mfr., 25 Forster St., Worcester, Mass. "Amico" signal system for control of bells and horns. A code signal device controlling a low voltage battery current used to operate magnet of a relay switch which controls bell or horn circuit of not over 6 A. at 125 V. Bells and horns to be wired in multiple.

SIGNAL APPLIANCES. Holtzer-Cabot Electric Co., The, Mfr., Brookline, Mass. Bells, "H-C," 6-220 V., A. C. and D. C. Type S. Water Tight Type. Double Gong Type. Horns, "H. C." 6-220 V., A. C. and D. C.

SOCKETS, STANDARD. Bryant Electric Co., The, mfr., Bridgeport, Conn. Keyless Porcelain Shell Sockets. "Bryant" or "Perkins."

SOCKETS, WEATHERPROOF. Newgard & Co., Henry, mfr., 953 Washington Blvd., Chicago, Ill. Types A, B and C "Newgard" sockets with vaporproof globes.

SPANNER STEAMER CAP. Madison, Geo. A., 735 Pierce Bldg., St. Louis, Mo. The cap of an irregular cup-shaped malleable iron casting which fits loosely over end of steamer or standpipe connection. It is held in position by lugs of coupling, one of which fits into a slot and other into a recess in casting. A stiff bronze spring in recess prevents removal of cap without use of a spanner wrench. A brass plate is held snugly against outer end of steamer connection and prevents introduction of dirt and foreign material. The cap is attached by a chain.

SWEEPING COMPOUND, SLOW-BURNING TEX-O-CIDE. Southwestern Chemical & Mfg. Co., Dallas, Texas. This product consists of sand, oil, sawdust, coloring matter and citronella in such proportions that fire hazard of mixture in use is small and in storage moderate.

SWITCH BOXES. Cleveland Pressed Steel Co., The, Mfr., 526-530 Chapman Ave., Cleveland, O. C. P. & S. Co., pressed steel boxes for mounting flush switches and receptacles and having one removable side to facilitate assembly for use in gangs.

THEATER APPLIANCES. Universal Electric Stage Lighting Co., mfr., 240 W. 50th St., New York, N. Y. Kliegl stage cable connectors.

WIRES, RUBBER-COVERED. Goodyear Rubber Insulating Co., The, mfr., 105 E. 131st St., New York, N. Y. Marking: Two green and one red threads laid parallel to wire, between rubber insulation and braid.

## RECENT CATALOGUES OF SAFETY DEVICES AND METHODS

By writing the firms the publications may be obtained without cost.
Please mention SAFETY ENGINEERING.

### "Aero" Automatic Fire Alarm.

Aero Fire Alarm Co.,
6 Church St., New York.

Booklets treating of the "Aero" Automatic Fire Alarm, the infallible mechanical fire watchman ever ready to detect a fire automatically. Describes the principle on which it operates, its construction, the reason for its quickness in action, its simplicity, and gives a few of the many installations of this alarm system which is adapted for the protection of buildings of all kinds.

### Angell Elevator Floor Stop & Lock.

Angell Elevator Lock Co.,
870 Atlantic Avenue, Boston, Mass.

Elevator floor stops and locks. What they are and what they do. How they protect patrons, employes and property, save time, power and money and prevent accidents. All this and more is told in the booklet recently received from this company. A book worth reading by all who use elevators in their buildings.

### Barrett Specification Roofs.

Barrett Manufacturing Co.,
17 Battery Place, New York.

Impressive bulletin showing full view of the great plant of the Standard Steel Car Works, Butler, Pa., the buildings of which cover a mile and have Barrett Specification roofs. It is claimed this 750,000 square feet of roof cost less for materials and construction than any other permanent roof would, and that in all probability these roofs will not cost a cent for twenty years or more, sometimes such roofs lasting even thirty years.

### Composition Flooring.

Troegerlith Tile Co.,
11 Broadway, New York.

Illustrated folder describing Troegerlith fireproof, sanitary, water repellent composite flooring, its advantages, its uses, efficiency and economy. One view shows this flooring installed in the New York Cotton Exchange pit, where it is stated it not only affords the best of satisfaction, but has saved about 50 per cent in labor of cleaning.

### Engine Stop.

Consolidated Engine Stop Co., Inc.,
351 West 38th St., New York.

Literature showing how flywheel explosions are prevented by the Consolidated Engine Stop and Speed Limit system. This company specializes in all types of engine stop and speed limiting devices, and their stops are used by the leading concerns in every industry. These stops are low in cost, simple to install, positive in action and insure against shut-downs or damage through the explosion of flywheels.

### Feralun.

American Abrasive Metals Co.,
50 Church St., New York.

Illustrated book devoted to Feralun Anti-Slip Tread surfaces for stairs, boiler room floors, shipping platforms, elevator door sills, etc., and which are so extensively used because they resist acid action, withstand the action of heat, resist abrasion and provide the most durable and efficient anti-slip tread surface. The use of Feralun for industrial purposes is also described.

### Fire Extinguishers.

Pyrene Manufacturing Co.,
1358 Broadway, New York.

Booklet of interest to all who seek a superior, scientific method of extinguishing dangerous incipient fires wherever they occur—in the home, the factory, the power station, the railway car, the automobile and the motor boat.

### Pulmotor.

The Draeger Oxygen Apparatus Co.,
406 First Ave., Pittsburgh, Pa.

Booklet telling why the Pulmotor should be at hand in every industrial plant; why every Safety Department needs a Pulmotor; why it is the ultimate test of life. A work telling the marvelous record in life saving it has attained; a treatise on artificial respiration well worth owning. Draeger mine rescue apparatus, smoke and ammonia helmets, emergency helmets and their self rescuer, are also described.

# SAFETY ENGINEERING

Vol. 29 MAY, 1915 No. 5

*ANNOUNCEMENT*—**SAFETY ENGINEERING has assumed the subscription contracts of "Protection Engineering." This magazine is to be sent hereafter to the subscribers of "Protection Engineering," beginning with the March number.**

## *Current Comment and News*

THE nineteenth annual meeting of the National Fire Protection Association in the Hotel Astor, New York City, May 11-13, was one of the most successful of the association's gatherings, with a large attendance of members and guests. In his address President Robert D. Kohn pointed out the necessity for the impressive effort of the association toward reducing fire destruction, and he congratulated the members for their participation in so worthy a cause. In addition to the committee reports, there were five-minute reports from active members on work in fire prevention and an address by F. I. Cooper on "The Status of Schoolhouse Construction in the United States." Motion pictures explained the Underwriters' Laboratories and its work. "Round Table" discussions had several subjects: "Building Regulations and Housing Problems," was discussed by Sidney J. Williams, Lawrence Duryea, W. Coster, Mr. Oakmand, Charles W. Phelps, R. L. Humphrey, W. E. Mallalieu, Mr. Crossley, who spoke on "Added Accommodations for Ten Thousand Workmen With Their Families," Mr. Forbush and H. W. Forster. "Uniformity of Building Laws and the Relation of State and City Codes," was discussed by Professor I. H. Woolson, J. R. Young, W. E. Mallalieu, Mr. Daw, W. F. Ballinger, A. R. Loveridge, L. H. Kunhardt and Mr. Mitchell. "Discretionary Powers" was discussed by Professor Gillau, R. P. Miller, Charles W. Phelps, Commissioner L. T. Bryant and S. A. Dies. The new officers are: President, Charles E. Meek, New York; first vice-president, Louis Wiederhold, Jr., Philadelphia; second vice president, D. Everett Waid, New York; secretary-treasurer, Franklin H. Wentworth, Boston. A report on the proceedings of the meeting, including the "Round Table" discussions, will appear in the June issue of SAFETY ENGINEERING.

President Collins, of the Chicago school board, inquired about the time it took to march the pupils out of certain school buildings. It should not take more than two minutes. According to the latest records it takes five minutes. Fire alarm boxes are from a quarter-mile to a full mile away.

The latest inspection report on New Rochelle, N. Y., says that the State laws relative to building construction are not enforced strictly; that the municipal laws are of some value, but are deficient in many important respects, and the provisions for enforcement are inadequate. The fire limits are not sufficiently comprehensive. The structural conditions are poor, and much frame construction exists in the mercantile district. Wooden shingle roofs are permitted outside of the fire limits. The municipal laws relative to explosives and inflammables are of little value; inspections are infrequent; conditions are poor. Overhead wire obstructions are fairly serious. Concerning the conflagration hazard, the report says that in the principal mercantile district nearly one-half of the construction is frame and nearly all of the rest is structurally deficient joisted brick; blocks are only moderately congested, but the streets are narrow; the overhead wire obstructions are bad; high winds are frequent; shingle roofs are prevalent; pri-

vate and public fire fighting facilities are inadequate; fires to involve large sections of the district are probable. In the few factories only local fires are probable. The normal hazard in the detached frame residential districts is increased by inadequate water supply.

**DARWIN P. KINGSLEY,**
**President of the Safety First Federation of America.**

Darwin P. Kingsley, president of the New York Life Insurance Company, has accepted the presidency of the Safety First Federation of America, that was organized at a convention in New York City recently. Under the terms of the by-laws, he becomes a member of the executive committee and one of the directors for the full term of three years. The federation is fortunate in selecting Mr. Kingsley as its chief executive, and the safety movement is fortunate in drafting him into service as one of the leaders. Accepting the presidency, Mr. Kingsley said that the federation "represents primarily an effort to achieve uniformity of action in the field of public safety through the power of a wider public opinion."

The latest report on Pottsville, Pa., says that the municipal laws relative to building construction are inadequate and of little value; therefore, the structural conditions are weak. The conditions relative to explosives and inflammables are fair. Rubbish was noted in block interiors. The handling of oils is hazardous in some instances. Wire obstructions are serious in the principal mercantile district. Concerning the conflagration hazard the report says that in the principal mercantile district, owing to weak construction and inadequate fire-fighting facilities, most of the blocks are subject to severe group fires, with probability of such fires spreading across the streets and involving the entire district. The hazard in the manufacturing plants is only local. The water supply is deficient in the residential districts, and the hazard of flying brands is present in spots.

The automobile accidents increase, and a considerable part of them is due to the recklessness of owners who drive their own cars, either without any adequate training, or in a condition in which they would not be fit to trundle a baby carriage. From such offenders there is no adequate protection in this State. They should be licensed, like other chauffeurs, and their licenses should be forfeited for recklessness or drunkenness, said the Brooklyn *Eagle*. There are two sides to the large number of accidents in which children are hurt and killed in the streets by automobiles. There are multitudes of reckless children and far too many reckless parents, as anyone can verify who watches the efforts of auto drivers to avoid running over children at play in crowded thoroughfares, sometimes under the unconcerned eye of parents or guardians. But there are also reckless auto drivers, and

**Official Destruction of Shacks.**

when they risk lives, it is commonly the life of some person innocently or properly in the street.

The owner of a row of shacks in Ocean Park, Cal., had disregarded the law which required removal after a conflagration had caused the extension of the fire limits. The row was an eyesore and a menace in the center of a prosperous business district.

The city authorities decided upon an extreme measure. One morning recently a force of workmen tore down the untenanted shanties, carried away the lumber, piled debris on a vacant lot and burned it.

The accompanying photograph shows a portable furnace in which was burned the rubbish left after the destruction of the shacks.

The report of the National Board of Fire Underwriters on structural conditions and hazards in Holyoke, Mass., says that the State laws relative to structural conditions are indefinite and the municipal laws are inadequate; enforcement of the laws is good. The fire limits are of good extent, but frame construction is permitted within them, including a part of the principal mercantile district. Structural conditions are weak. Wooden shingle roofs are permitted outside of the fire limits. The State laws relative to explosives and inflammables are not sufficiently inclusive. There is good control by the State police through the local fire department, that makes efficient but infrequent inspections. The local conditions are fair to poor. The principal mercantile district is free mainly of overhead wires, but such wires create obstructions in the tenement districts. Concerning the conflagration hazard, the report says that in the principal mercantile district severe individual and group fires are probable and there is a serious danger of fires spreading across the narrow streets, but none should involve the entire district. Serious group fires are probable in the manufacturing, minor mercantile and tenement districts. The hazard of flying brands is increased by frequent high winds.

Everyone will admit that the handling of street traffic to prevent congestion, avert many accidents and constant damage claims as well as to support property values, is the most difficult of all city problems. Few cities have been able to even keep pace in street facilities with population growth, said the Duluth *News-Tribune*. Superior street is narrow for the demands made upon it even now. Its sidewalks are little more than ribbons. With 20 to 30 jitneys without schedule time, hurrying to beat each other, added to the double street car track, service with a car a minute in rush hours and the freedom of the street to heavy traffic and vehicles of all kinds, the situation is becoming serious. Traffic police would help; traffic rules would help; putting the jitneys on schedule would help. It might be wise to throw all jitney service on streets unoccupied by car tracks; it may even be that their operation on streets occupied by car tracks is a violation of the street car franchise. But none of this would more than help.

THE CHICAGO & ALTON RAILROAD COMPANY
EXECUTIVE DEPARTMENT

OFFICE OF
THE PRESIDENT
TRANSPORTATION BUILDING
CHICAGO

W. G. BIERD,
PRESIDENT

April 14th, 1915.

Mr. Franklin Webster,
Editor, Safety Engineering,
80 Maiden Lane, New York, N.Y.

Dear Sir:

Acknowledging receipt of your letter of April 10th.

The Chicago & Alton Railroad maintains no Safety Department.

Yours truly,

W G Bierd

**This interesting letter is a reply to a general inquiry sent by the Editor of "Safety Engineering" to a number of railroad companies and industrial corporations, asking for particulars of their organizations for safety.**

## NATIONAL SAFETY MOVEMENT.

One way that an employer can encourage fire prevention in his establishment: "Don't do anything yourself that you don't want others to do, which may cause fire."—*G. A. Leuser.*

The education of the individual workman must, and will, play an important part in accident reduction in the future.—*John G. Brennan.*

"Safety First!" These two simple words have come to hold the attention of every efficiency engineer.—*J. J. Sproul.*

To promote and keep up conditions most conducive to safety requires indefatigable effort on the part of the employer and employe; in other words, the only effective method to attack and solve this problem lies in intelligent co-operation.—*Richard Hoag.*

Do not tamper with electric wires and apparatus unless you are an electrician.—*Clem P. Host.*

The matter of safety lies mainly in the hands of the men themselves. A great aid in the "Safety First" campaign is instructing the men in personal carefulness.—*Henry V. Neal.*

Spontaneous combuston can be attributed usually to carelessness or ignorance. With the proper regulation and education it can be almost entirely eliminated.—*C. W. McKeehen.*

By teaching the children, some of whom will in a few years administer the laws, a long stride toward fire prevention will be taken.—*J. William Morgan.*

The importance of regulating properly the quantity of moisture in the air in connection with good ventilation can not be over estimated, because humidity has the greatest influence on the health and comfort of those living in it.—*Edward T. Walsh.*

Many accidents can be attributed to the weaknesses of humanity. Among them are carelessness, over-confidence, absentmindedness; they are usually habit formed failings, and I venture the opinion that with earnest effort they can be overcome or at least modified.—*Richard Hoag.*

If a workman indulges in unsafe practices, he should be taken to the safety committee for a heart-to-heart talk.—*George A. Cowee.*

# *Proposed National Electrical Safety Code*

*By W. J. Canada, Associate Physicist, Bureau of Standards, Department of Commerce, Washington, D. C.*

WHILE the general health of the entire country is improving constantly, due to the general advance of civilization and industrial applications, and the annual death rate becomes lower each year, certain accident hazards are, on the contrary, increasing, and these, of course, demand the most thorough scrutiny from those interested in accident prevention. Among the causes of injuries and disability which are increasing one of much prominence is the electrical hazard entailed by the generation, distribution, and use of electrical energy. This hazard is growing very much more rapidly than the population, and it has indeed more than doubled in the last ten-year period.

It must be recognized, to be sure, that the utilization of electrical energy and the diversity of its applications have more than quadrupled in the ten-year period, and it is also true that electrical energy has during the time replaced other agencies for producing light, heat, power, and chemical changes, such as gas, oil, and steam, which doubtless would have entailed still larger total disability of the population through a continued use of energy from these other agencies. Looked at from the standpoint of the proportion between electrical hazard and use of electrical energy, the hazard to the electrical workers and the public is therefore only one-half that existing ten years ago. Viewed, however, from the standpoint of proportion between electrical hazard and all other causes of disability, the electrical hazard to the electrical workers and the public is 75 per cent greater than that existing ten years ago.

Since the total fatalities by electrocution, falls from poles, electrical burns, and allied injuries approximate 1,200 to 1,500 annually at present, and this number is increasing rapidly, the importance of this drain on the economic resources of the community can be realized. These fatalities are the more important as they occur on the average to persons in vigorous health, such as employes in occupations requiring strength and skill, or to the public actively engaged in business and for that reason exposed to electrical dangers in the streets, or to children whose economic value is increasing.

Judging roughly from the trend of compensation acts that the average economic value of each worker to the community is not less than $10,000, it follows that a loss of at least $15,000,000 results annually from accidents entailed by electrical practice. No European country approaches such totals, or even a comparable figure. It would be of advantage, entirely aside from humanitarian considerations, to expend $100,000,000 during the next few years on physical improvements of electrical installations to reduce the life hazards involved, and for educational methods among electrical workers and the general public, if by such means half the fatalities alone could be prevented, even though all temporary and extended disabilities resulting from hazards of electrical practice should still remain at their present large but unknown totals.

These considerations show the economic life waste by electrical practices to be apparently somewhat greater than the estimated fire losses from that part of electrical practice which endangers building interiors. It is important also to keep in mind that these very fire losses from electrical defects inside buildings also entail indirectly some fatalities and many other injuries. These fire losses, too, it must be remembered, are being minimized by the quite general application of fire prevention rules, originating in the careful and co-ordinated study of competent fire prevention engineers and

inspectors, expressed in the National Electrical Code, and applied to the installation of wiring and equipment in buildings throughout the country for twenty-three years by the most uniform, widely distributed and generally competent inspection facilities which have ever been available for making a building code effective—the inspectors of fire underwriters' associations and municipal electrical departments.

No such study, as that outlined in the foregoing, has been attempted to consider the hazard to life from electrical causes, nor has there been an organization for such a study comparable with the inspectors of the fire underwriting interests. One factor, tending to delay attention, has been no doubt the fact that electrical casualty lists are never large for any one accident, and the public attention is drawn to catastrophes rather than to gradual drains, such as result from the electrical hazard. Lately, however, through the wide adoption of compensation acts and the organization of casualty prevention bodies, such as the Workmen's Compensation Service Bureau, the electrical life hazard has received more than local or occasional attention.

The attention of the public itself is now aroused quite thoroughly and many State commissions have issued a few requirements, designed to remove obvious hazards in electrical construction or operating methods. The municipalities have made some restrictions, usually such as establishing voltage limitations for overhead lines, or requiring lines to be placed underground, but, being made without co-ordinated and adequate study, these restrictions have too often retarded the development of requisite electrical facilities for the public use, rather than removed the actual causes of hazard. Some educational work among employes has been accomplished by a number of operating electrical companies, more particularly the larger companies which could afford to assign thoroughly competent men to study the problem, at least in their own particular cases.

Some companies have also adopted advanced methods of construction, and some engineering associations have proposed more or less detailed and comprehensive specifications for electrical construction, in which life hazard has received consideration. These specifications have so far failed to secure general agreement among companies or associations, and, in fact, they conflict seriously with one another. Some of the requirements are based on untenable assumptions, and while much of the material is susceptible of useful application to general conditions, much must be eliminated and many untreated subjects must be included before these specifications can be entirely applicable or desirable for use as rules for accident prevention.

In reviewing what has been done toward electrical accident prevention, and what it is practicable to do, we are met by two great differences between electrical fires and electrical injuries. The former occur almost wholly in buildings and frequently extend to other buildings, with consequent large losses in several buildings. Electrical injuries, on the other hand, occur largely outside of buildings, and the losses are ordinarily confined to the individual concerned at the point of hazard. Even the smallest fire, too, entails an appreciable and measurable loss, while the small electrical injury gives, as yet, no appreciable or measurable loss. It may be conjectured that the many requirements, which have been developed for interior wiring to prevent fire hazard, have also reduced life hazard. This can never be known absolutely, but it is a natural inference and a real evidence of the careful preparation of the electrical fire code.

In seeking the causes of electrical accidents, it is found that the methods of reporting such accidents, in use at present by States or casualty companies, do not provide the necessary information on which to base improvements in construction or operation. One of the principal future problems is to secure uniform and sufficiently accurate electrical accident information. On even fatal cases it is difficult to secure useful information which is comparable with that of other fatal cases.

During the past two years the National Bureau of Standards has made a detailed analysis, comparison, and study of all the

available accident statistics, construction specifications of associations, the construction rules of various State commissions and municipalities, the construction codes of European countries where the electrical code was developed largely from the life hazard viewpoint, and of the practices of hundreds of operating and manufacturing electrical companies throughout the country.

It became increasingly evident, as this study progressed, that State commissions and municipalities alike were desirous of co-operating toward the development of a single national safety code for electrical practice, rather than of separately developing many codes, varying at State or city boundaries, and so entailing both confusion for manufacturer and operator and questionable adequacy for the protection of workers and the general public. By the co-operation of all interested it has been assured that the interests of all will be cared for and that the general adoption of the final result cannot fail to promote rapidly electrical practices which will reduce electrical fatalities and disabilities to reasonable proportions.

The Bureau of Standards, with its facilities for the thorough study of such engineering questions, its accepted freedom from bias, and with the full co-operation from engineering associations, workmen, and public authorities, occupies, it is thought, an unusually favorable position for carrying on such a study. The results of this work are contained in the proposed National Electrical Safety Code, consisting of four parts. The first contains safety rules for the installation and maintenance of electrical supply stations and equipment, the second for overhead and underground electrical supply and signal lines, the third for electrical utilization equipment in workshops and similar places, and the fourth part contains of safety rules for the operation of electrical equipment and lines.

The operating rules in preliminary form were published in August, 1914, after a very extended study of the operating requirements found in effect among companies in this country, and of those adopted by certain State commissions, as well as the similar but more rigid rules of European countries. Criticisms were requested from more than two thousand companies, State commissions, municipalities, and societies, to which the rules were sent, and many of which had co-operated closely in the initial preparation.

Several hundred letters of suggestions have been received and analyzed carefully. Most of these endorsed the general plan and scope of the rules, while many companies were ready to adopt them as a whole in the preliminary edition. Many suggestions for the improvement of individual rules were received also, certain suggestions being repeated often and showing needed changes. The Accident Prevention Committee of the National Electric Light Association has been co-operating with the bureau on this part of the safety code, and it has also submitted these operating rules, with some changes, to the criticism of a considerable number of companies.

After several conferences, a careful revision of the operating rules has been made jointly with this committee and the rules are now believed to be in a satisfactory condition for general adoption. They are reduced considerably in number and bulk since the issuance of the first edition, inconsistencies have been removed, and the wording and convenience of reference much improved.

The first three parts of the code, dealing with installation requirements, have been more difficult to prepare, and they have required still more careful criticism by the many interests affected. During the past four months these parts have been submitted in preliminary form at a large number of small and hard working conferences, representing diversified interests and including competent engineers and inspectors. The criticisms evoked at these conferences have been utilized in redrafting the results resubmitted, and the rules were thus improved greatly in form and substance. It is owing to the free co-operation which has been given by representatives of all interests that the resulting safety rules are now in satisfactory form for preliminary distribution in moderate numbers.

Among the conferences may be mentioned three with a committee composed of members of the Electrical Committee

and the Safety to Life Committee of the National Fire Protection Association and representatives of the Workmen's Compensation Service Bureau. At these conferences the avoidance of overlapping and conflict with the fire underwriters' electrical code was considered carefully. Certain changes were, from this consideration, recommended in the 1915 issue of the National Electrical Code, and these have been approved substantially at the biennial meeting of the Electrical Committee. It was the expressed feeling of the Electrical Committee that rules in which the life hazard is the sole or preponderant consideration should be eliminated from the fire code, which must be applied largely by fire inspectors, but that a national accident prevention code is desirable in order to meet the need of State public utility and industrial commissions and of municipalities for an adequate single standard to govern accident prevention inspections, and that the two codes should be developed entirely in harmony, so that States and particularly cities may use them readily and consistently.

Other conferences were held with engineers of the Pennsylvania Electric Association at the request of the chief engineer of the Pennsylvania Public Service Commission, with engineers of the light, power, signal, and railway companies of Boston and vicinity, and with engineers of the Cleveland Electrical Illuminating Company, and of the municipality of Cleveland. Several conferences were also held with engineers of the General Electric Company at Schenectady, and with representatives of important electrical supply and signal interests in Washington and New York on several occasions.

A conference was held also in Washington with a number of the engineers of State public utility and industrial commissions engaged actively in the consideration or preparation of electrical safety rules. This resulted in the strong tendency on the part of the commissions to defer action on such sets of rules, even where tentative sets had been prepared, until the proposed National Electrical Safety Code should be ready for adoption.

The Workmen's Compensation Service Bureau, which in its measurement of relative life hazards to which workers are exposed, and which must necessarily refer to an accepted standard set of rules, uniform throughout the wide territory which its inspection covers, was preparing last fall to issue a tentative electrical standard, but since its study of the proposed National Electrical Safety Code, it has abandoned independent action and assisted the Bureau of Standards. This will cover adequately the needs of the Workmen's Compensation Service Bureau, since, where requirements in the proposed rules are not sufficiently strict to reduce hazards acceptably from a casualty viewpoint, a charge in the rate will compensate for the remaining hazard, without injustice to the industry affected, whereas in certain other cases a very strict requirement in the rules, if met by the industry, might entitle it to a credit.

The first three construction parts of the safety code are now ready for issuance in a limited edition for more general discussion and criticism, but not yet for adoption. This edition is to be distributed to engineering association committees, to State commissions, to underwriting associations, to municipalities, to manufacturing and operating companies, and to interested individuals, with a request for careful examination and criticism by their representatives within a month from the date of receipt by them.

Meanwhile, a series of further conferences is being arranged for in the western and southern parts of the country, and another month of inspection and consideration is to be given by bureau engineers to the field conditions and requirements in those sections.

Subsequent to these inspections and conferences and the receipt of the constructive criticisms, careful comparison and study are to be made of the further material at hand, in preparation for a formal conference on the proposed code, which is to be called for July 1 and 2 in Washington, and in which State and municipal representatives, representatives of fire and accident prevention associations, of the engineering associations and of the workmen are to be invited to participate. At this formal conference, it is hoped, the revision of the preliminary

edition as prepared by the bureau engineers may be approved by the representatives present.

It is the recommendation of the Bureau of Standards that, after general approval, the National Electrical Safety Code be given an actual field application during a trial period of one year or less, in order that further experience may develop any serious errors or omissions still remaining. It is believed that by pursuing such a course the educational value of the rules will be secured and that all interests will co-operate thoroughly to make the code adequate. On the other hand, if the code were made mandatory immediately, the defects remaining even after the careful preparation, the lack of familiarity of the affected interests with the requirements, and the different interpretations given by inspectors in different communities might tend to make enemies for the rules instead of friends, and partly defeat the full purpose of the code by delaying improvements rather than encouraging them.

It is recommended also that, after the trial period, the rules be made applicable to all new work or reconstruction and to all operation, and that guards and grounding be provided in existing equipment where the cost will be no more than would be required for providing the same degree of protection with new equipment. The time permitted for provision of such protection would, of course, be determined by the administrative authority.

By this method of procedure in the development and presentation of the proposed National Electrical Safety Code it is expected that it will be made adequate and acceptable, as a fair requirement, to all the interests concerned—the public, the worker, the operator, the manufacturer, the underwriter; that general adoption of a single code will result, rather than the alternative, which is the production of many and varying codes by different cities, States, casualty interest, employers, and workers, each representing the experience or the interest of a limited portion of the community, often contrary to the interests of other portions.

Revisions can thereafter be made when necessary by a conference committee, to be proposed at the July conference. This committee would consist of the representatives from associations, cities, State commissions, and insurance interests, with which the Bureau of Standards can confer frequently, with probably a smaller working sub-committee able to meet at shorter intervals with the bureau's engineers. The bureau, in turn, will continue its investigation, and study especially the more obscure features of construction or operation where commonly accepted asumptions are not supported entirely by the evidence at hand, and further tests or analyses of existing data may bring a more helpful result.

The bureau and the committees named can further assist the commissions and cities that desire to make their inspections of the greatest value through uniform interpretation, and also through their educational effect. It is contemplated that the explanatory notes, accompanying the preliminary edition of the rules, will be revised and amplified in succeeding editions and will serve to make the intent and application clearer to inspectors who must apply and explain the rules, as well as to operators and manufacturers who must comply with them.

Since the fullest understanding of the necessity and intent of rules is far more effective, in procuring willing and intelligent compliance, than the imposition of legislative acts, no matter how well considered, unless these acts meet a convinced and willing public, it is hoped that the educational and co-operative method of trial will be approved generally by all interests. The Bureau of Standards will appreciate any suggestions toward increasing the success of this plan or toward improvement in the rules of the proposed National Electrical Safety Code.

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I know from personal experience that most police officers are lamentably ignorant, even in such simple cases as fainting or exhaustion, of what should be done. Lives are lost as the result of this lack of instruction.—*T. H. B. Patterson.*

# HAZARDS FROM NON-GROUNDED LOW POTENTIAL CIRCUITS

*By Henry A. Hale, Jr., M. E.*

ONLY LITTLE attention seems to have been given to the fire and accident hazards that are prevalent where secondary electric circuits have not been grounded properly, and to the importance of inspecting ground wires already installed to make sure that the connections are in proper conditon.

Nearly every city and town has ordinances to require the proper grounding of all low potential circuits, when the primary is of 550 volts or more and the secondary not over 250 volts, but owing to laxity in enforcing such regulations it behooves the building owner and the inspector to make sure that such safety precautions are being carried out.

As an illustration of what may happen under such circumstances, I will cite an instance that occurred this year in a bustling eastern Massachusetts town.

A single transformer was reducing a 2,300-volt circuit to supply a lighting current at 110 volts to four neighboring factories. The town passed an ordinance several years ago to require all lighting systems to be grounded, but in this case nothing to that effect had been installed.

During a snow storm the lighting circuit wires, crossing the street, short circuited with the 2,300-volt cables. Immediately fires broke out near the main switches in three of the factories. Just at the time one of the employes in the fourth factory stepped to a water faucet to get a drink. With one hand on the faucet, he touched with his other hand a nearby frame of an emery wheel (Fig. 1). An iron wire was tied from the emery wheel guard to a lamp reflector, to hold the lamp steady.

When the excessive current entered the lighting circuit, the bulb of the lamp was punctured, so that the current followed the reflector, iron wire

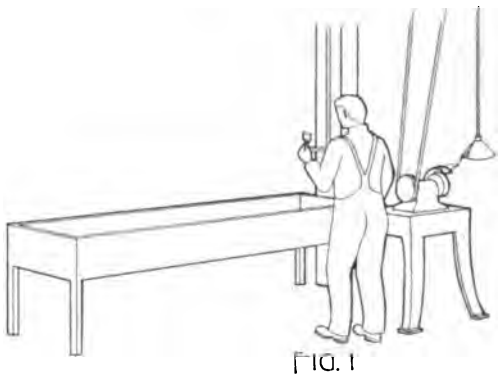
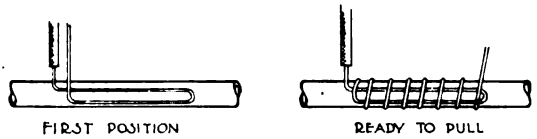


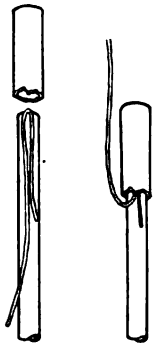
FIG. 1



FIRST POSITION READY TO PULL

GROUND CONNECTION TO WATER PIPE

FIG. 2



GROUND CONNECTION WITH PIPE AND CAP

FIG. 3

and emery wheel guard through the young man's body to the water pipe. Thus the man's body served to ground the entire circuit. He was killed instantly by the excessive shock, and, inasmuch as it was ten minutes before the current was shut off at the power house, it was fortunate that more persons were not electrocuted at the time.

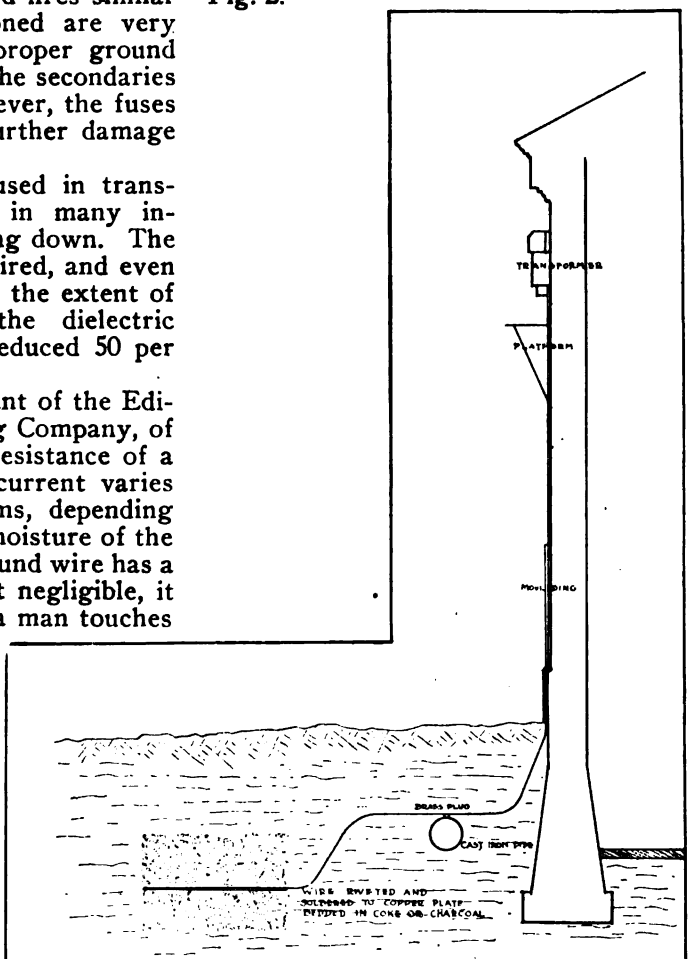
Transformers are known to break down occasionally; that is, the insulation between the primary and secondary coils become deteriorated so that the current arcs across from the high to the low potential wires. For this reason also accidents and fires similar to the accident mentioned are very liable to occur unless proper ground wires are provided. If the secondaries are duly grounded, however, the fuses will burn out and no further damage result.

Moisture in the oil used in transformers is responsible in many instances for their breaking down. The insulation becomes impaired, and even if moisture is present to the extent of only 0.06 per cent, the dielectric strength of the oil is reduced 50 per cent.

Recent tests at the plant of the Edison Electric Illuminating Company, of Boston, show that the resistance of a man's body to electric current varies from 500 to 50,000 ohms, depending upon the thickness and moisture of the skin. Since a proper ground wire has a resistance that is almost negligible, it follows that even when a man touches a wire at a time when a short circuit occurs he will receive only a shock from the circuit that the wires would carry normally.

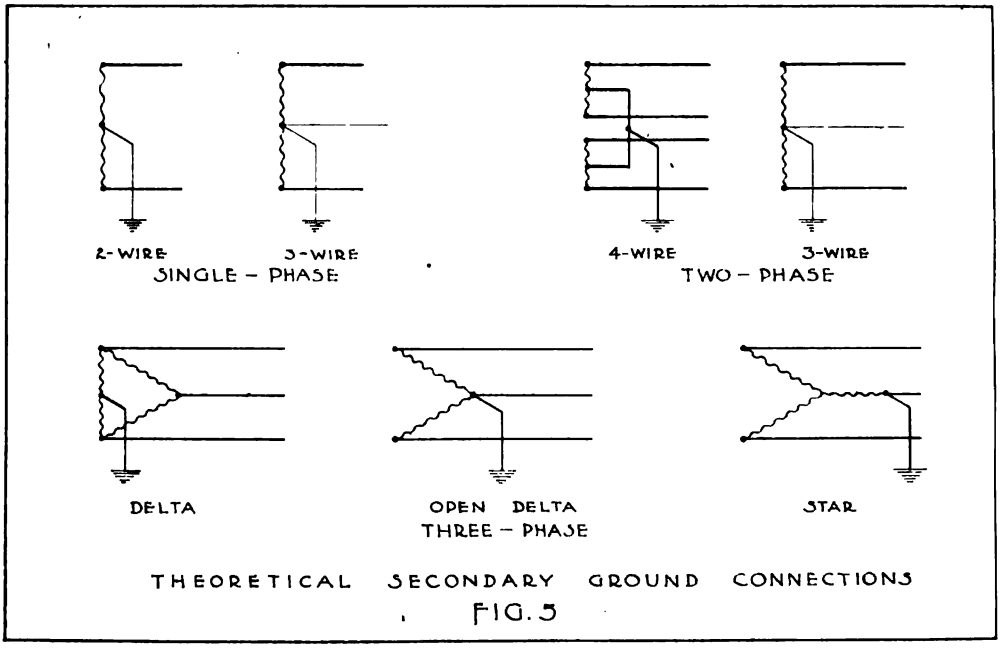
Ground connections should be insulated properly, and kept outside of the buildings as far as practicable. For 3-wire direct systems the connections at the station should be as large as the neutral wire, and elsewhere should not be smaller than No. 6 B & S gauge. On 3-phase systems the ground wire should be as large as any one of the three mains.

If a ground connection must be made inside a building, it should lead into the cellar and be connected to the water pipes on the street side of the water meters or main cocks. In making the connection, remove all scale from the pipe, and sweat the wire into a lug attached to a firm clamp on the water pipe. Another method is to solder the wire to a brass plug that may be screwed into one of the pipe fittings, or the wire may be attached, as shown in Fig. 2.



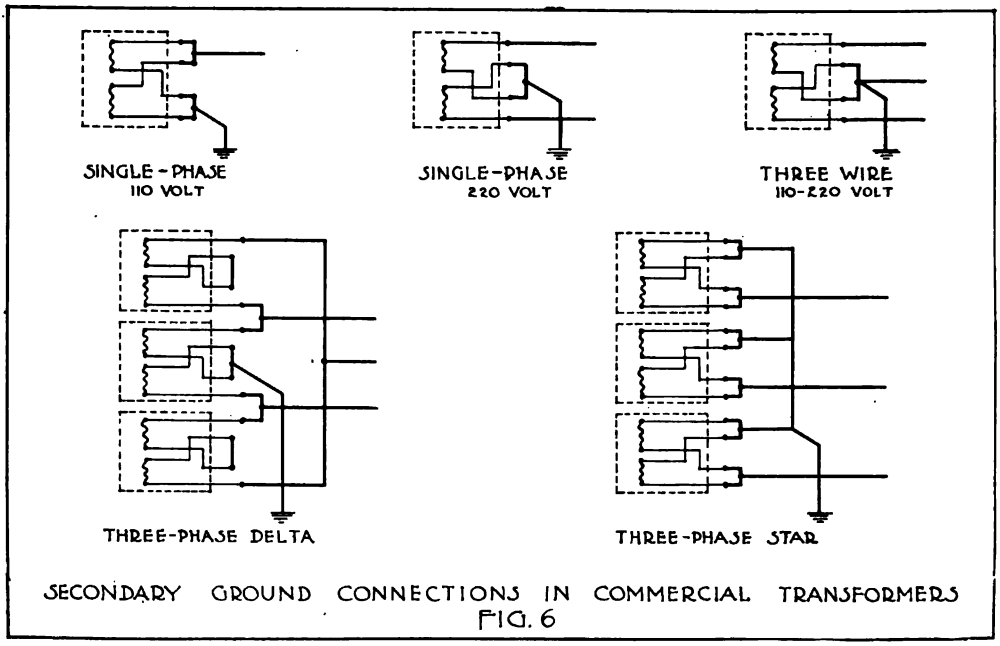

GROUND WIRE CONNECTIONS

FIG 4




THEORETICAL SECONDARY GROUND CONNECTIONS

FIG. 5




SECONDARY GROUND CONNECTIONS IN COMMERCIAL TRANSFORMERS

FIG. 6

It is best, wherever possible, to make the ground outside the building at the transformer. Several means are employed to accomplish this, a very common way being to solder the wire to the inside of a ¾-inch galvanized pipe, the lower end of which is pointed and driven down to damp earth. Another method is illustrated in Fig. 3, where a cap is used instead of solder.

An excellent type of grounding connection is illustrated in Fig. 4. In this case the wire leads to a brass plug screwed into a cast-iron water pipe, and also to a No. 16 gauge copper plate about 3 x 6 feet embedded in crushed

coke or charcoal at a level of permanently damp earth. It should be remembered that there is never danger from getting too good a ground, and it is well to include all available underground piping systems, including the lead sheath of underground cables, particularly at central stations and at transformer sub-stations.

No matter which outside method is used, the ground wire should be encased to a height of 7 feet from the surface as a protection to passersby from shock.

The ground connection on a transformer should be made at or near the neutral point of the secondary coil. Most of the transformers have connections provided for the purpose. Where the neutral point is inaccessible, the ground should be made on one side of the secondary circuit. If transformers feed systems with a neutral wire, the neutral wire should be grounded every 500 feet.

Accompanying diagrams indicate the proper point for making connections at the transformer, but for sake of simplicity no primary windings are shown. (Figs. 5 and 6.)

Tests should be made after the transformer secondary has been grounded, to determine if the desired protection is obtained inside the building. If the transformer is some distance away, it may be found that the connection needs to be extended.

Owing to local conditions of the earth, the effectiveness of some ground connections has been confined to very small areas, and it is essential to examine carefully the entire ground connection at least once a year.

Thus, it should be remembered, a high voltage may be impressed accidentally on a low tension circuit (1) by crossed external wires and (2) by the breaking down of the transformer. Fires and serious accidents are liable to result, unless proper ground connections have been made, and it is hoped that every one will see that the wires in the buildings over which he has control have been grounded properly and that they are inspected carefully at regular intervals.

## CONCRETE IN EDISON FIRE.

A letter addressed to numerous newspapers by Thomas A. Edison under date of April 28:

The Detroit Brick Manufacturers' and Dealers' Association is distributing throughout the United States a pamphlet entitled "The Edison Fire," the contents consisting of a reprint of an article appearing in a trade journal, *The Clay Worker*. The entire purpose of this publication is to discredit and if possible retard the use of reinforced concrete in the construction of fireproof buildings.

The results of the fire at my plant on December 9, 1914, are used in an entirely false and misleading manner. Of the seven reinforced concrete buildings none was destroyed. A small section of the upper floor of one of the buildings fell in, but was supported by the lower floors. The pamphlet referred to presents three views of this, the suggestion being that they were of three different buildings. The brick administration building, to which they refer, which remains standing, was protected by an adjacent concrete building and was not subjected to the fire.

Every brick and steel building which was attacked by the fire was completely destroyed, together with all the machinery it contained, while the damage done to the concrete buildings amounted to about 12½ per cent, and of the machinery contained in the concrete buildings 98 per cent was saved and is now in operation. Manufacturing was resumed in some of the old concrete buildings within a few weeks after the date of the fire.

Temperatures were far in excess of those in the ordinary fire, but reinforced concrete showed its superiority over any other fire resisting material.

I regret that any representative of the brick interests should have seen fit to sponsor this publication, the evident purpose of which is to deceive. The millions of dollars of fire losses in this country annually make it a matter of moment that the superiority of reinforced concrete for fireproof structures should be thoroughly understood, and it is for such purpose that I have written this letter.

## PULMOTORS SAVED LIVES.

The rescue squad of the New York fire department, operating pulmotors, saved lives at a fire that partially destroyed a five-story tenement in Sixth street, New York, on April 26. Twenty persons, overcome by smoke, were revived by the use of pulmotors. The fire started in an apartment in the first story and was carried upward through a dumbwaiter shaft.

In the installation of safeguards one must be governed by the possibility and not the improbability of the occurrence.—*Richard Hoag.*

# EXPLOSION IN OIL STORAGE STATION

## SIX PERSONS KILLED, TANK BUILDING DEMOLISHED AND WINDOWS OF MANY HOUSES SHATTERED.

Courtesy of Brooklyn Daily Eagle.

**Ruins of Tank Building After Explosion.**

[An explosion occurred on March 13, 1915, in a wholesale gasoline and kerosene oil station, operated by the Crew-Levick Company, at Atlantic and Montauk avenues, Brooklyn. One of the theories of the cause of the explosion is that gasoline that overflowed was ignited by coals in the fire-box or sparks from the chimney of a locomotive near the building; and the other is that the manager, who entered the tank building just before the noon hour, pulled the motor switch and thereby furnished the spark to ignite an explosive mixture of gasoline and air.]

REPORT of the Bureau of Surveys of the New York Board of Fire Underwriters:

CONSTRUCTION.—The building in which this explosion occurred was a small two-story structure of brick and concrete, trianguiar in shape, located on the corner of Atlantic and Montauk avenues. The walls were of 12-inch brick and the floors were of reinforced cinder concrete, about 6 inches thick. The first floor was divided into three sections, a pump room, a motor room and a toilet, by 4-inch tile partitions, communicating directly by openings with kalamein doors. Open stairs extended from the pump room to the second floor. Entrance to this building could be effected through a kalamein door to the yard (on the east side) or a door opening on Montauk avenue.

In addition to the building, there was a one-story brick and concrete office building at the extreme southwest corner of the lot; also a concrete loading platform along the east side of the premises. A railroad siding for the unloading of tank cars ran through the center of the yard. A railroad track, connecting the Long Island Railroad on Atlantic avenue with the yards to the westward, cut across the corner of the sidewalk less than 15 feet from the two-story building.

OCCUPANCY.—The occupancy of the plant as a whole was that of a wholesale

gasoline and kerosene oil station; it was operated by the Crew-Levick Company. The main storage of oils was in four tanks buried at about the center of the yard, each of 18,000 gallons capacity, two for kerosene and two for gasoline. On the second floor of the corner building were two steel tanks, each 5 feet in diameter and 8 feet high and holding 1,100 gallons. One of these tanks was used for kerosene and the other for gasoline. The oils were pumped into these elevated tanks from the underground tanks by two horizontal duplex plunger pumps, one for kerosene and one for gasoline, located in the first story of the building. These pumps were driven by belt from a single phase A.C. electric motor in a compartment cut off by 4-inch tile but communicating with the pump room by a kalamein door. The motor was operated by a control switch on the south wall of the motor room. Two-inch delivery pipes with meters and control valves led from the elevated tanks to a loading platform adjoining this tank building and to the loading platform on the east side of the yard so that drums and tanks could be filled by gravity feed. The pumps were operated whenever it was necessary to fill the elevated tanks, and it is claimed these tanks were drained at night.

STORY OF THE EXPLOSION.—At the time of the explosion there was a Long Island Railroad switching locomotive, attached to two tank cars, standing on the siding leading to the Long Island Railroad freight yards, the locomotive being directly in front of the gravity tank building. The locomotive engineer observed oil flowing from the Montauk avenue door of the building. He told four small boys who were also watching the flow of oil to run to the office and tell the bookkeeper. They did so, returning immediately to the tank building. The bookkeeper went to the Atlantic avenue side of the yard and told the manager, who at the time was closing the Atlantic avenue yard gates, that the oil was overflowing. The manager entered the building; a moment later a terrific explosion occurred, practically demolishing the building. The tanks fell and the gasoline and kerosene flowed over the ground, burning. As far as can be ascertained there was no explosion in these tanks. The force of the explosion was toward the northwest. The Montauk avenue door, from which the gasoline was observed flowing, was found nearly 200 feet distant in this direction. The manhole cover on the top of the gasoline tank was observed, immediately after the explosion, hanging by one stud bolt. The other studs were broken off, but the fractures were rusted and darkened as if they had been broken a long time. If such was the case, then the manhole cover was practically only laid on top of the tank, and, when the tank had been filled by the pump, the gasoline flowed over the edges at the manhole, over the floor and down the open stairs.

There are two theories as to the ignition of the gasoline. The first is that it was ignited from the firebox or sparks from the chimney of the locomotive, only 15 feet distant from the building. The other is that the manager inside pulled the motor switch which furnished the spark necessary to ignite the explosive mixture of gasoline and air in the house. This latter theory seems rather more probable, as the main explosion was inside the house; it occurred immediately after the entrance of the manager, and a strong southwest wind outside would have tended to dissipate the vapors on the outside.

DAMAGE.—The tank house was practically demolished. The contents of the tanks were burned, except about a barrel of gasoline which with considerable water was found in the gasoline tank after the fire. The cab of the locomotive was practically burned off; the engine was not so seriously injured that it could not be removed under its own power. The contents of the underground gasoline and kerosene tanks were intact. Many windows in the vicinity were shattered by the concussion.

LOSS OF LIFE.—William F. Avery, who was in charge of the plant, was in the building at the time of the explosion and was killed. The four small boys were caught by the falling walls and killed. An old man who was standing

nearby was so seriously injured that he died later.

CONCLUSIONS.—The storage of volatile inflammable oils in gravity tanks above ground is a condition always fraught with great danger and should be prohibited, as in the cases of garages and similar establishments.

The motor room in this case communicated with the pump room directly by a door opening. Access to such motor rooms should be only by doors to the outer air.

## DANGERS FROM WOODEN IRONING TABLES.

How readily many fires may be prevented has been strikingly illustrated in Baltimore. State and city fire officials made the rounds of the places in which they believed fires might occur. They pointed out fire dangers, had materials removed that might cause fires and issued instructions that, in the future, proprietors or the last persons leaving buildings in which fires occurred must make explanations.

In the 28 days following this action by the officials there were 74 fires; during the preceding 28 days the fires numbered 99.

Overheated irons in tailoring establishments were found to be responsible for numerous fires and a campaign of correction was carried out. The result was that wooden ironing tables were replaced by iron or asbestos-covered tables. Fires from overheated irons have been reduced in number.

## INVESTIGATION OF CINDER CONCRETE.

In co-operation with the Department of Civil Engineering of Columbia University, the Bureau of Buildings, Borough of Manhattan, City of New York, conducted an investigation of cinder concrete floors. The objects were:

To determine the compressive strength and elastic properties of cinder concrete cast under the conditions and with the quality of aggregate which obtain in actual practice.

To study the action of typical cinder concrete slabs and to establish either a rational or a theoretic basis of design.

To standardize the product known as cinder concrete by treatment of the raw materials and to formulate specifications tending toward a greater density and uniformity of product.

The concrete of the test cylinders for determining the compressive strength and elastic properties was obtained at buildings in course of construction in Manhattan, the mixture being identical with that used in the actual construction and taken directly from the contractor's batch. Two hundred cylinders were secured, forty at each of five buildings. The purpose was to test them at the ages of 1 month, 2 months, 6 months and 1 year.

A report on the tests, published recently, said that it was apparent that the value used at the time on the weight of cinder concrete (96 pounds per cubic foot) was too low. The figures showed also that cinder concrete, as used in New York City, was a variable product, due probably in a large measure to the character of cinders used in the aggregate.

A criticism in the report was that, with the increased demand for cinder concrete fireproofing, such poor material as the powdery coal ash had been substituted for good, clean steam coal cinder. The remark was that the practice could not be condemned too strongly as producing an uncertain and possibly dangerous material when used in building construction. Great care should therefore be exercised in the selection of cinders.

## JACKSONVILLE'S MAINS.

The extension of the separate high-pressure system of fire mains to the warehouse district on the south side of McCoy's Creek, Jacksonville, Fla., has not been made, although authorized and provided for in the budget for 1913. This extension is one of the recommendations of Chief Haney, submitted recently.

# *Motion Pictures In Fire Safety Work*

*By J. E. Latta.*

IT HAS been said that the world is always ready to make a beaten path to the door of every man who has something of value to offer in the way of making living more comfortable and life more complete. As a matter of rhetoric such an assertion is immensely pleasing; as a matter of fact it will not bear even casual scrutiny, certainly not as applying to modern conditions. These days the individual or the institution that has developed something that is worth while must generally undertake to educate the public concerning its value before people can be expected to show great interest in it. This is especially the case in fire protection endeavor.

In effective fire protection education is fundamental. It is scarcely less important than engineering and scientific investigation. It should be education of the sort that aims ultimately to bring to the attention of all the people, in a convincing way, the real significance of our fire loss; education that undertakes the widest possible promulgation of information concerning means that are found efficient in combatting this enormous waste. This is something more than publicity, as that term is used commonly. It is publicity of the intensive kind, the sort of thing that will count against the indifference to the fire waste that seems so lamentably characteristic of the American public. The writer is convinced that any worker in the modern fight against fire who has not caught the spirit of this sort of publicity is falling short of a proper appreciation of his duties and his opportunities.

The foregoing is sufficient explanation, if indeed any explanation at all is needed, for the following brief account of what appears to be in the nature of an entirely new departure in fire protection publicity.

Most of the readers of SAFETY ENGINEERING have, at least, some notion of the work of the Underwriters' Laboratories. Many of them are aware in a general way that the laboratories endeavor to secure the best and fairest opinion regarding the merits of every device, appliance and product in respect to fire and life hazards. They are more or less familiar, too, with the laboratories' methods of promulgating the findings of their engineers and councils. Moreover, many readers of these pages have seen the actual operation of the main testing station in Chicago.

Underwriters' Laboratories is always desirous of having the public in general and fire protection and accident prevention interests in particular know intimately of its work. Hence people, seeking information concerning the institution, are always welcome visitors. But occasional visits are not sufficient of themselves to do more than gain a rather general impression of the make-up of the plant, and perhaps gather some specific information concerning such tests as happen to be under way at the time of the visit.

Furthermore, it is appreciated that the people who have an opportunity to visit the laboratories are only a small fraction of the public that the institution is serving. Hence, at the request of friends of the laboratories, there has been prepared a series of motion pictures, illustrating in an instructive and impressive way the investigations and tests that are carried on at the Chicago plant, and these are to be available for use in educational work in the fight against fire and accident. The pictures aim to provide the man unable to visit the institution with important information concerning this service which without them he could not obtain satisfactorily. At the same time they will afford those who do come occasionally data more detailed and comprehensive than could be acquired usually by even frequent visits.

Test in Chemical Laboratory.

Hood in Chemical Laboratory.

The "movies" carry the observer into practically every department of the Chicago testing station, and show him, wherever he goes, characteristic tests in process of performance. The following summary indicates the general character of the films; but the reader should bear in mind that it is not attempted here to catalogue or enumerate the collection with any considerable degree of completeness. The few cuts shown with this article were selected more or less at random from the collection.

One of the pictures provides an unusually good view of the main building of Underwriters' Laboratories in Chicago, which is conceded to be the best example in America of a fireproof structure furnished with fireproof equipment.

Subsequent views show various sections of the chemical laboratories, where different members of the laboratories' staff of chemists are busy with the tests and experimental work that make up the usual routine of their duties every day.

Here are chemists making analyses of such materials as the rubber linings of fire hose, the insulating compounds used on rubber-covered wires, sweeping compounds, roofing materials, electric conduits, hazardous fluids, paints, etc.

Chemical hoods of the latest and best type, provided with powerful electric-motor driven fans, carry away fumes and vapors and keep the air pure and free from all substances whose presence might prove detrimental to the comfort and health of the men making these analyses.

In what is known as the optical room experts are using the microscope, the spectroscope and the polariscope for refined tests on the materials used in certain kinds of fire protection and accident prevention equipment.

Another engineer is operating a machine designed for making determinations of the strength and stretch of rubber compounds.

Measuring Temperature.

Testing Fire Window.

Action of Nitric Acid and Sawdust.

Test of Automatic Sprinkler Head.

In the physico-chemical section of the chemical laboratories electric furnaces are in operation, the pyrometer being employed to measure the high temperatures attained; a spontaneous combustion test on a sweeping compound is under way, and likewise a flashing-point test of a hazardous liquid. Tests of friction matches are going on, and the operation of vapor-explosion test apparatus is shown.

Views in the chemical laboratories include also some of the more interesting parts of the equipment of the weights and measures laboratory, and of the special tests laboratory.

ELECTRICAL DEPARTMENT.

Passing on to the electrical laboratories, one sees in operation a large machine for testing snap switches and sockets. This piece of apparatus is entirely automatic in its operation, and is arranged to turn out and off any type of switch or socket on the market now.

Another test of particular interest is that applied to flexible tubing, used to protect the conductors in interior electric wiring.

Flexible tubing manufacture is one of the hundred or more industries in which Underwriters' Laboratories' Label Service is operated. The tubing is inspected regularly by the laboratories' engineers at the factories, and such of it as is found to be standard is labeled. Check tests are made in Chicago from samples sent by the inspectors at the factories. The motion pictures cover heat tests on the exterior coating, moisture tests, and examination for fireproof quality, tensile strength, etc.

The laboratories' tests on rubber-covered wire are covered rather completely. Engineers are seen making the measurements prescribed in the National Electric Code, preparing samples for the voltage breakdown and wrapping tests,

Test of Pressing Iron.

Tests of Rubber Lining of Hose.

and performing such of these and other tests as can be shown in an instructive manner.

Standard tests on cartridge enclosed fuses are shown in a way that is interesting and instructive, and a somewhat spectacular demonstration of the fire hazard of improper or inadequate fusing is bound to prove impressive to persons concerned with fire and accident protection.

As the pictures move along, other illustrations of the work and equipment of the electrical department of the laboratories make plain the hazard of improper construction in numerous household and other electrical appliances and indicate the proper means of safeguarding against hazards of this sort.

PROTECTION DEPARTMENT.

A division of the laboratories' work that appears always to be of particular interest to every visitor at the Chicago plant are the investigations conducted in connection with fire doors, fire windows, automatic sprinklers and similar protective appliances, equipment and materials. In the pictures the observer has an opportunity to see just how the problems are taken care of.

For example, as relates to fire doors and fire windows: Complete standard tests are conducted, and the pictures are made to include every detail that it is possible for a camera in the hands of an expert operator to catch. The methods of exposure to high temperatures are made clear; also the processes of measuring the temperatures and the heat transmission and of determining the effects of high temperature exposure on the appliance itself and the effects of heat radiated to flammable articles on the unexposed side; and so on throughout the tests.

Automatic sprinkler testing is covered scarcely less completely. The illustrations include sprinkler equipment installed under conditions similar to those of actual service; the equipment exposed to fire; and views that emphasize the effectiveness of automatic sprinklers in extinguishing fires.

The illustrations of the work of the gases and oils department comprise numerous tests on hand fire appliances and on devices, materials and apparatus which, though hazardous in character, may be safeguarded in an acceptable manner. Than some of these there are probably no tests conducted in the laboratories that are more interesting; certainly few more interesting to the layman.

DISPOSAL OF THE PICTURES.

The pictures are to be kept on file in the office of the secretary of the National Fire Protection Association, to be used by him and by persons he may care to have use them; and at the Stubbs Lecture Bureau in Chicago. The writer also will carry a set of pictures on his trips over the country as special agent of the laboratories, and will show them to gatherings of people interested whenever it is desired and convenient.

Secretary Wentworth's publicity work in fire protection campaigns needs no commendation here. Mr. Lurton H. Stubbs, who will use the pictures for the Stubbs Lecture Bureau, is qualified for such work. He has had fifteen years' experience as a fire insurance man; during a large part of the time he has specialized on fire prevention service in his relations with customers. He is a natural entertainer, with a cheery manner which puts him on friendly relations with his audiences. He has delivered fire prevention addresses several years, and has come to be regarded by those who know him as one of the most effective speakers in the work.

It is planned to add to the collection of pictures from time to time, as additions are made to the laboratories' equipment. To be included soon is a machine of special and unique design for testing columns, beams, girders, etc. Engineers are to be seen as they conduct tests on built-up steel columns, reinforced concrete columns, and practically every other material of that class employed in modern building practice, the material under test to be subjected to the conditions of an actual fire or conflagration while the engineers study its behavior. In short, it is intended to make the pictures provide as complete a representation of the current operations of the laboratories as an up-to-date "movie" can properly show.

# IMPROPER HANDLING OF DANGEROUS ARTICLES

INFORMATION concerning some of the recent accidents in the transportation of explosives and other dangerous articles appears in Bulletin No. 27 of the Bureau of Explosives, New York City:

LIQUEFIED PETROLEUM GAS.—A tank car, containing 6,000 gallons of high gravity, unblended liquefied petroleum gas, was popping off at 3:35 p.m. when received by the carrier from a connecting line, and was popping off at 7:20 p.m. when the employes of the receiving line removed the dome cap to relieve the excessive pressure in the tank. The removal of the dome cap permitted the gas to escape in a spray, which reached a lighted lantern 75 feet away behind a scale box. The liquefied gas and the vapors were ignited by the flame of the lantern, and the resulting fire and explosion burned a car inspector about the hands and face and scorched three box cars and the shingles of a section house 100 feet distant. The fires surrounding the tank car were extinguished, and the fire in the tank car was subsided within 15 minutes. Estimated loss $1,150.

After the fire the safety valve was tested. It showed a pressure of 28 pounds per square inch before popping. A paragraph of the Interstate Commerce Commission's regulations prescribes that tank cars must comply with M. C. B. rules. The shipper also violated a paragraph in using an ordinary tank car as a container for this shipment.

This accident illustrates the hazards involved in handling tank cars containing dangerous articles and also serves to emphasize the importance of keeping lights and fires away when the tank is in a leaking condition, or when, as in this instance, it is necessary to allow the escape of some of the contents to relieve excessive pressure. Inflammable liquids, when in large quantity, form vapors that will ignite at a considerable distance, depending on the kind and quantity of the liquid and the direction and force of the wind. The vapors go with the wind and not against it. While the railroad employes realized they were handling a dangerous article and exercised care, it is believed that compliance with the regulations would have prevented this fire. One paragraph states that the dome cover should not be unscrewed until the absence of vapor pressure in the tank is verified by lifting the safety valve.

A similar accident occurred at St. Louis, April 22, 1911, in which the spray spouted into the air a distance of 200 feet, and the vapors were carried by the wind to a house 75 feet away.

HYDROFLUORIC ACID.—A wooden box, containing four ceresine bottles of hydrofluoric acid, which was discovered leaking by the express messenger while separating the freight in his car, was returned to the express office. Two of the bottles were broken. In an attempt to remove the other two, the bottom of one of the bottles fell out, spilling the acid on the clerk's foot and burning it. Two of the bottles were packed in sawdust in interior wooden boxes, while the other two were placed flat in the outside box surrounded with excelsior. The shipper violated a paragraph of the regulations in not placing the last two bottles with their filling holes up, and in failing to mark the outside box "THIS SIDE UP." The shipper also violated the regulations by not using an "incombustible porous material that will not be attacked chemically by the liquids, and in quantity sufficient to absorb and hold all of the liquid in any such vessel."

SULPHURIC ACID.—While handling a supposedly empty carboy which had contained sulphuric acid, a warehouseman was burned about the arm and hand by a small quantity of the liquid spurting out of the carboy. The carboy was not supplied with a stopper and neck protector as required.

CARBONIC ACID GAS.—Two shipments, consisting of 25 and 17 cylinders of compressed carbonic acid gas, respectively, were piled on a steamship pier. The cylinders were on their sides and were

piled five and six cylinders high. They were being moved on a hand truck in lots of three and four, and a truck load had just been wheeled away when the remaining cylinders in the pile started to roll. A freight handler endeavored to prevent the pile from falling by using a hook, but one of the top cylinders slipped off to the cobblestone pavement and exploded, rendering him unconscious. He was taken to a hospital with lacerations about the head and chest. The cylinders were widely scattered. One was blown across the street, over a three-story building, into the rear yard, breaking a cask of oil, but not injuring the cylinder. Two other cylinders were blown across the street, landing on the sidewalk and resulted in leakage and loss of the contents of one of them. Two cylinders were missing, and are believed to have been blown into the river. The fragmentation of the exploded cylinder into such small pieces and preliminary investigation made by the bureau indicate that the cylinders were made of brittle steel.

GASOLINE.—An empty tank car, which had contained gasoline, was being filled with water for use in water service. A section laborer climbed on the tank to gauge the water, and when he was near the manhole the gasoline vapors were ignited by the flame from the lighted lantern he was carrying. The gaseous mixture of air and vapors exploded and threw him off the car to the ground. He was burned and his shoulder was fractured. This accident was the result of failure to heed the warning on the inflammable placard to "keep lights and fires away" from the car. Many similar instances have been reported, and there is apparently no reason for the continuance of such carelessness.

GASOLINE.—A tank car, containing gasoline, was unloaded by consignee's employe. Two boys mounted the top of the car and entered the tank through the dome. Another boy was nearby and upon the failure of his playmates to return summoned aid. A man entered the tank and succeeded in lifting them out with a rope. The younger boy was dead and the other was overcome by the gasoline vapors. Regulations place on the party offering an empty tank car for transportation the responsibility of seeing that the dome cover is in place, and this accident is another illustration of the results due to the failure of consignees to properly secure the dome covers on empty tank cars. A similar and fatal accident was reported in Bulletin No. 18.

GASOLINE (LIQUEFIED PETROLEUM GAS).—A check clerk found a match on the platform and after lighting it threw it to the pavement. It passed within five feet of a drum containing gasoline made from blended liquefied petroleum gas, which was standing in the sun and was evidently in a leaking condition, for when the lighted match passed near it the gaseous mixture of air and vapors surrounding it was ignited. An explosion followed, but prompt action on the part of the clerk in kicking and pushing the drum to the pavement prevented further damage, other than the loss of the drum of gasoline. If the drum had been prepared by the shipper as required by the Federal regulations the accident would not have occurred. The danger of more serious results from this accident should serve as a warning to railroad employes with regard to the use of matches near dangerous articles. That portion of the caution on the red label for inflammable liquids, which the drum bore, requiring it to be kept away from lighted matches and direct sunlight, was violated in this instance.

GASOLINE.—An empty tank car, which had contained gasoline and was being returned to originating point, was being examined by a car inspector and a repairer. They removed the dome cover to ascertain whether the car was loaded or empty, when the inspector thoughtlessly struck a match which ignited the vapors and caused an explosion. The car was not damaged, nor was there any damage to the carrier's property on account of the explosion, but the inspector's right hand was burned. Quite a number of accidents occurred in the past year due to similar carelessness in handling empty tank cars.

STRIKE-ON-BOX MATCHES.—While a freight car was being unloaded smoke was noticed coming from a box described

as containing groceries. It was taken out of the car, and examination disclosed that in addition to the groceries it contained two packages of safety (strike on box) matches, each containing 12 small boxes. Four of the small boxes were destroyed, and the balance of the shipment was delivered to the consignee. Investigation showed that some of the igniting composition on the sides of the small boxes had been smeared on top of the slides, and possibly, on the inside of one of the slides, where friction due to handling the package might cause ignition. This fire was due primarily to the improper packing of the matches with the other articles in violation of the regulations covering the shipment of dangerous articles by freight.

BOOK MATCHES.—A 20-pound package, consisting of a pasteboard box wrapped in paper, was placed on the sill of an express car for unloading, when heavy smoke was observed to come from it. The express agent pulled the package out of the car and threw it to one side of the platform, where he extinguished the flame. The package contained 100 books of domestic safety (strike on box) matches in addition to other advertising matter. The matches involved were the pocket-size book matches intended for advertising purposes and were forwarded by a brewing company to one of its customers. As is usual in cases of this kind, the shipper professed ignorance of the requirements of the regulations prohibiting the shipment of any kind of matches with other articles, and also of the requirement in the express regulations covering the proper packing, marking, labeling, etc., of these matches. Through the co-operation of the manufacturer of the matches arrangements have been made to notify all their customers of book matches for advertising purposes of the requirements of the Federal regulations.

MOVING PICTURE FILMS.—A steel baggage car lighted by electricity and heated by steam and a stove, which contained baggage, company material and express matter, including among the latter a shipment of moving picture films, was discovered on fire after leaving a station about 8:30 p.m. The train was run to the next station, where the car was cut out, and railroad employes used a stretch of hose until the city fire department arrived and extinguished the fire. The loss on car and baggage amounted to $1,400, and the loss to the express company will aggregate several thousand dollars. When the car started on its trip there was a fire in the stove, which was not replenished. The films were placed on top of a crate of live animals on the opposite side of the car from the stove and about 15 inches from the other side, with only a small express package separating the films from the steam coils. There was evidently considerable heat in the car, and from the investigation made by the railroad the indications are that the fire was caused by the ignition of the films, probably on account of their being placed too near the heated steam coils. Examination of the remains of the films showed that they were enclosed in a circular tin container, and, according to the statement of the express messenger, they were packed in an outside wooden box. Investigation is being conducted by the bureau to determine further facts in connection with the fire, whether the presence of the films actually caused the fire, and whether or not the films were packed in accordance with the regulations for safety.

OIL, CRUDE PETROLEUM.—While transferring crude oil from a leaking tank car to another car by means of a small steam pump connected with the shop boilers, the steam in the shop was shut off, which caused the pressure on the pump to run up. Just as the boy operating the pump turned the valve to shut off some of the steam there was a flash between the steam and oil end of the pump, which a second or so later ignited the oil leaking from the tank car. The resulting fire damaged the car and the roof of a shed nearby and destroyed about 600 gallons of oil. Our inspector is of the opinion that the fire was due to a spark caused by grit of some kind getting into the stripping block on the valve stem being struck by the rocker arm attached to the piston rod, and as the pan on the ground to catch leaking oil was

almost directly under the block sufficient vapors were present to cause the flash. It is possible that instead of a spark being struck the outside working parts ran hot, either on account of grit, or lack of lubrication, or both.

PERMANGANATE OF POTASH.—Smoke was discovered coming from a wooden box just as it was being placed in an express car for shipment. The contents were soon afire. The box was taken from the depot and after the fire was extinguished it was found to contain a gallon can of formaldehyde and a five-pound paper carton of permanganate of potash, packed in excelsior. Investigation developed that this was the first shipment of its kind forwarded by express by the shipper, and the only shipment of permanganate of potash not in its original container that this company ever made. Freight regulations prohibit the shipment of outside packages containing in the same compartment interior packages, the mixture of whose contents are liable to cause a dangerous evolution of heat, gas or corrosive materials. When formaldehyde and permanganate of potash are combined they generate an inflammable gas, which, as in this instance, often results in sufficient heat to cause a fire. Improper packing was the primary cause of the accident.

## CHUTES FORM FIRE ESCAPES.

In a California school the fire escapes, built in the form of chutes, are used as parts of the playground equipment, and on them the pupils spend a great part of their time after school hours, thus becoming familiar with the use of them.

A chute is on each side of the fire escape balcony at the second story of the school building. Each is of galvanized sheet iron, extending from the balcony to a support three feet in height, making a drop of about 40 feet. It has an incline of 45 degrees, and it is supported by a framework of 2-inch angle iron.

At the lower end is an upward tilt, which has the effect of lifting a child to a standing position on the ground. A sand pile is under the end of the chute, so that there will be no jar to the body when a child alights.

The pupils become so familiar with the use of the chutes during their playtime that the building can be emptied in a short time when fire drill is called.

**Using the Fire Escape in a California School.**

## VAULT TEST OF PICTURE FILMS.

To demonstrate the area of ventilation necessary for vaults designed to contain motion picture film an elaborate test was conducted on the premises of the Universal Film Manufacturing Company, at Leonia Heights, N. J., on April 22, under the supervision of F. G. T. Stewart, chairman of the executive committee of the National Fire Protection Association.

A structure of 12-inch terra cotta blocks, having a vent opening in its side of approximately 285 square inches for its total area of 133 cubic feet, was filled with reels of motion picture film in cans and out of cans on side racks corresponding to the usual shelving in commercial vaults. Several bags of loose film were piled in the space between these racks and the whole was ignited by an electric spark.

In all the vault contained about 1,800 pounds of film, rather more perhaps than the average vault of this size would carry normally, but the conditions were made purposely rather severe to avoid any chance of failure either to ignite the film or that the conclusions drawn might not be acceptable.

With a roar that could be heard for a long distance, the tongue of flame, which shot out from the vault almost immediately after the ignition of the film, projected itself 75 feet, continuing for several minutes, or until all the gases generated within the vault were consumed. The vault was undamaged, proving that the area of ventilation provided was undoubtedly sufficient to prevent explosion from the rapid decomposition of film under similar conditions.

Previous to the vault test 100 reels of film stored on shelving made of iron piping within a cabinet made of asbestos lumber and angle iron were ignited. A single wall of asbestos divided the cabinet into two sections, each being vented through a 7-inch metal vent and the two combined in a 14-inch metal vent a short distance above the top of the cabinet.

The result of this test was unsatisfactory in a measure, the contents of both sections being consumed, due probably to the deflection arrangement of the vent flues quite as much as to radiation of heat through the single wall partition.

## SPRINKLERS AT COTTON FIRES.

The operation of a sprinkler system twice in one day in the plant of the Bush Terminal Company, Brooklyn, saved one of the piers and a part of the cotton stored thereon and cotton in one of the storehouses.

In the morning of May 7 two longshoremen, who were unloading a lighter, discovered fire in bales of cotton on pier No. 1. The sprinkler system operated and 65 heads opened and controlled the fire until the arrival of three engines of the Brooklyn fire department. The battalion chief said that the sprinkler system saved the pier.

Another fire burst forth in building No. 18. It was extinguished by the opening of eighteen sprinklers. The building, a one-story brick structure, without windows and with only a few doors, contained bales of cotton.

Giving the particulars of the fire President Bush said:

"The operation of the sprinkler system at the fire on pier No. 1 was the greatest demonstration we ever experienced of the ability of a sprinkler system to put out a big fire in the cotton storage business. The pier is about 1,400 feet long, on which were stored about 1,200 bales of cotton in tiers of six to eight bales high.

"As soon as the fire started 65 sprinkler heads opened, and so effectively did they operate that the flash fire was controlled and held until the arrival of the fire department. The fire was due to spontaneous combustion.

"I consider that, inasmuch as about 3,400 sprinklers were installed in the system on the pier, the fact that 65 heads opened and controlled this fire in such a large area is really wonderful. Fire Commissioner Adamson, who visited the scene of the fire, acknowledges that without sprinklers the fire department would have been taxed to its utmost, especially as another fire broke out in cotton storehouse No. 18, about two-thirds of a mile away. That likewise was extinguished by sprinklers.

## AN ACCIDENT WITH A MORAL.

For the particulars of an accident in one of the mines of the Copper Queen Consolidated Mining Company in Arizona, SAFETY ENGINEERING is indebted to Wallace McKeehan, safety inspector. The photograph for the accompanying illustration was taken in 215 drift, Southwest, at the place where "Ham" Daniels was hurt.

**Where "Ham" Daniels Was Hurt.**

Daniels was mucking out a machine round that had been blasted by the night shift. When he started to work he picked down the back, but the round had broken through the quartz material in which the drift had been driven, going into clay. After a while that commenced to slack. Daniels noticed some fine stuff fall from the roof, but before he could get back under the set a slab fell, striking him in such a manner as to dislocate his hip. James Cook was about twenty feet away, and he soon rolled the slab from Daniels's leg, pulling him back under the sets. All of the ground shown in the picture did not fall at that time.

Daniels's injury is severe, and it will lay him up for some time. The cartons, containing the first aid dressings, may be seen at the bottom of the picture.

Daniels had been in the employ of the company about twenty months, working most of the time on the level, where he was hurt, and he understood the place in which he was working.

The lesson to be learned from this accident is: No man, no matter how experienced, can trust the ground in that district. Daniels, if he had any doubt of the stability of the back, should have tailed down spiling from the tunnel cap behind and should have watched the back whenever he was under it Ground, freshly broken, air-slacks quickly, especially if it carries a little clay. Take no chances; watch your ground; bar down the slabs if possible; if not, hold them in place with stulls or stringers tailed down from the timbers. Miners in the district face a deadly peril in the numerous "falls." Run no unnecessary risks! It may be your turn next!

## GOOD GUARDING, BUT NOT COMPLETE.

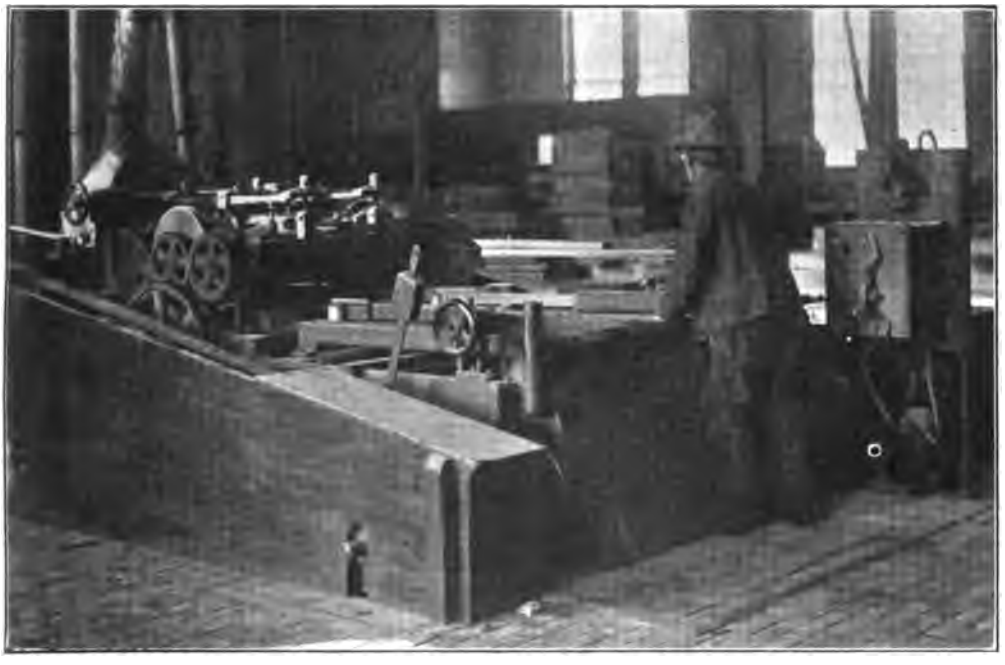
The two accompanying pictures present a striking contrast. They were taken before and after the Baltimore & Ohio Railroad became interested practically in "Safety First." The upper picture speaks for itself. All dangerous moving parts are exposed.

The lower picture shows the machine after the application of the principle of safety. The guarding, as completed, is substantial, but, before the machine may be termed properly guarded, all of the gears should be enclosed.

The shaft end, protruding through the belt casing, center of picture, should be covered. It is very dangerous, likely to catch hold of the trousers of men going by.

Attention is directed to the rheostat near the operator. It should be enclosed to prevent accidental contact and electric shock. With the additions mentioned, the planer will be as safe as it is practically possible to make it.

**Many Skilled Workmen Have Been Injured Permanently When Caught by Belts on Machines Like This Planer.**



**The Baltimore & Ohio Railroad Company Decided to Protect Its Men by Putting Guards on the Dangerous Places. The Projecting End of a Shaft Is Dangerous, and It Should Be Covered.**

# SAFETY WORK BY RAILROADS. WHAT ONE COMPANY HAS ACCOMPLISHED

BETTER CAUSE A DELAY
THAN AN ACCIDENT

CHICAGO AND NORTH WESTERN RAILWAY
Safety Bulletin No. 15
March 19, 1915

IT TAKES LESS TIME TO PREVENT AN ACCIDENT
THAN IT DOES TO MAKE A REPORT OF ONE

**THIS DIAGRAM SHOWS THE REDUCTION IN DEATHS AND INJURIES TO NORTH WESTERN MEN SINCE THE ORGANIZATION OF THE SAFETY FIRST COMMITTEES, AND THE STATEMENT BELOW GIVES THE FIGURES:**

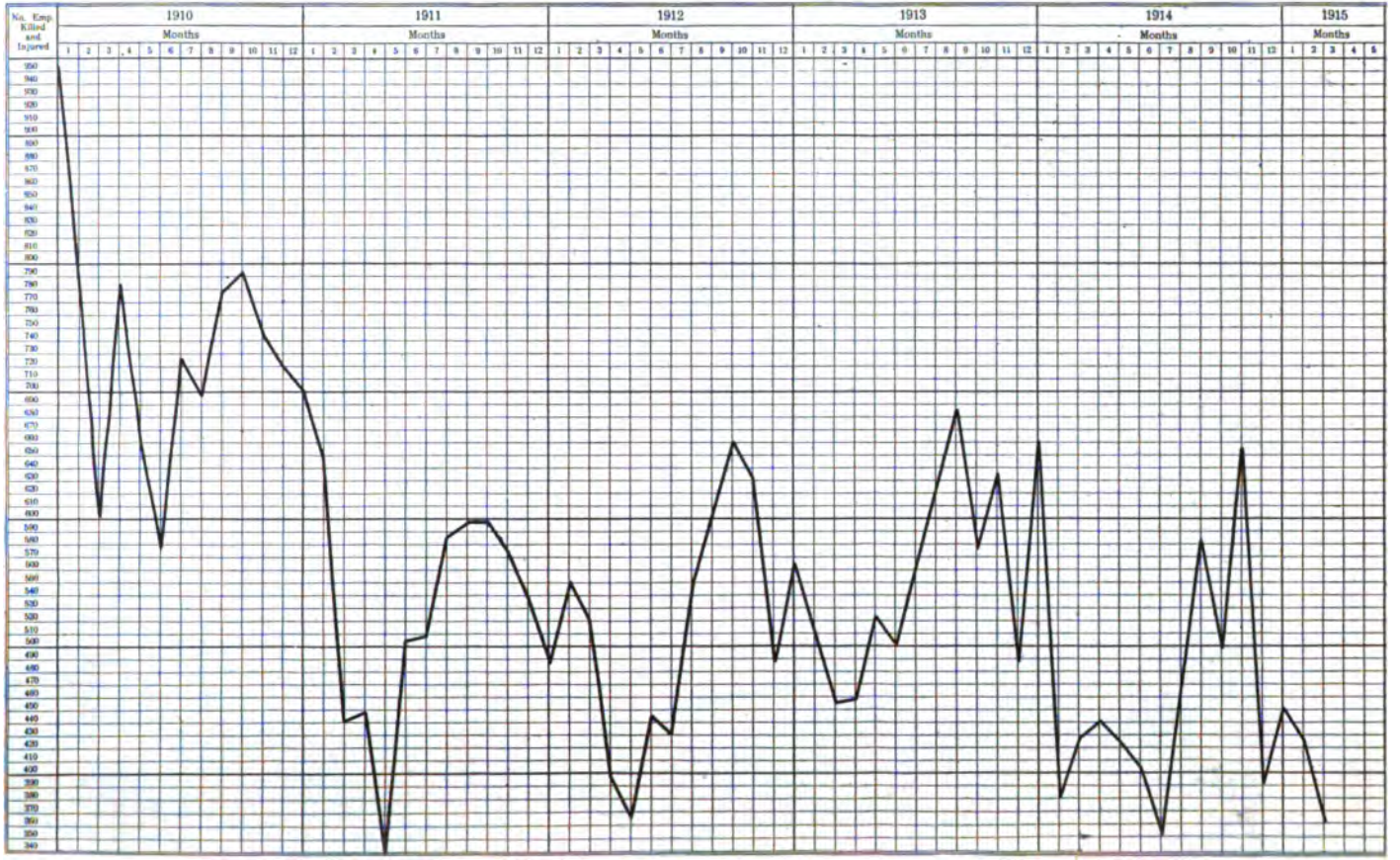
| | KILLED | INJURED |
|---|---|---|
| 1910 | 97 | 8404 |
| 1911 | 76 | 6025 |
| 1912 | 73 | 6043 |
| 1913 | 67 | 6395 |
| 1914 | 49 | 5520 |

**WE NEED YOUR HELP TO KEEP THE LINE GOING DOWN**

**SAFETY FIRST means fewer widows, orphans and cripples and less destitution and misery.**

R. E. Richards
Chairman, Central Safety Committee

This diagram was prepared by, and is published on the recommendation of, C. E. Sherman, Secretary of the Wisconsin Division Safety Committee.



# EDITORIAL

**The New Era.**

IT IS reported from Pittsburgh that the Carnegie Steel Company has been conducting an extensive campaign among its employes for the purpose of showing them how moral and sober-living when off work cannot but reflect itself advantageously both to themselves and to the corporation for which they are working; that a sober man is a safe man in every respect.

There are few corporations who have done more actual mechanical safety work than the Carnegie Steel Company in common with all other subsidiaries of the United States Steel Corporation. They have in fact reached the point where they cannot hope to further materially reduce their accident ratio by mechanical means. The remainder must be done by education, and the campaign referred to was undoubtedly started with that in mind.

The Carnegie Steel Company and numerous other corporations and individual employers of labor in the United States have recognized the fact that there is no reason for the killing of a man on a machine or appliance which by careful study and the outlay often of only very little money can be made safe. There are two parties to the contract of employment, however, and, where the employer has done his share in the safety campaign, it devolves upon the workmen to embrace their responsibilities, to realize that there is as little excuse for a man being killed or being the cause of the death of a fellow workman because his mind has become dull by an excessive use of liquor and other drugs or from immoral practices and excesses when off work.

Students of our industrial development, friends of true progress in the amelioration of the somewhat strained conditions existing between capital and labor, cannot remain blind to the fact that the method adopted by these corporations is the one and only plan upon which lasting results in industrial peace may be achieved. It is indeed the golden rule, applied by practical, hard-headed business men to practical concrete business institutions, and it is to be noted that more and more of our industrial establishments are adopting the plan as GOOD BUSINESS POLICY.

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**Occidental Absorption of Oriental Wisdom.**

IN his memoirs Lord Charles Beresford, mentioning a fort on the Yangtse River, relates: "I noticed a battery of 60-ton muzzle-loading guns that were loaded by depressing their muzzles into the magazine. I ventured to suggest that any carelessness in sponging out the guns might result in blowing up the magazine. The general said that the English mandarin was extraordinarily clever, that a year previously a magazine had blown up in precisely that way and had killed 42 men. *They had then rebuilt the magazine on exactly the same plan.*"

Can any one reading this recall parallel instances, say of factories rebuilt after destruction, reconstructed schools, theatres and business blocks? Cases of apparent acceptance of Chinese methods and wisdom in "Enlightened" America?

Some day, perhaps, some Hobson will arise to denounce with vigor the "Yellow peril" of ideas that have become fusilized. Meantime—Well! We are quite likely to go on discussing roast pig the same way Kwang Loo did 7,000 years ago—and finding it an entirely new discovery each time.

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**Providing Pure Water for Workers.**

THE importance of providing pure water for employes in industrial plants is indicated by a decision of the New Jersey Supreme Court in an action against the Mount Holly Water Company, sustaining the verdict of the lower court, that awarded damages on account of the illness of children that had been brought on by drinking the water supplied by the company. The court said that the case was barren of any testimony from which a reasonable inference could be drawn that the illnesses of the children were due to any other cause than the water supplied by the company.

One of the contentions of the company was that the case must fail, because an allegation in the complaint was that the illness, with which each of the children was afflicted, was typhoid fever. It appeared by the testimony that it was not true typhoid, but para typhoid, a milder form of the disease. On that contention the court said that it was a matter of no consequence whether or not the illnesses of the children were true typhoid fever. The crucial question was whether their illnesses were due to the unwholesomeness of the water supplied by the company. It was the duty of the company to give water fit for domestic purposes, including fitness for drinking.

If suspicion exists as to the impurity of the water supply for a factory, a mill or any other place where workmen are employed, it is easy to install filter systems and, by means of sanitary fountains, avoid the danger of illness in work forces—illness that in many cases has caused much loss of time while away from work and consequently waste of money for medical attention.

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**Reducing Fire Dangers.**

THE sentiment in the fire insurance business that fire underwriters should encourage property owners to reduce fire dangers was not general nineteen years ago, but far-sighted underwriters, impressed by the conflagration hazards in cities, with losses increasing year after year, perceived that premium rates would rise to a prohibitive point, if cities were permitted to grow in combustibility as well as in population. Therefore, a movement was started to teach the people that they could regulate their fire insurance premiums, to a large extent, by reducing fire dangers.

In the notable campaign for popular education, the National Fire Protection Association has had a prominent place. Other influential factors have been the Underwriters' Laboratories, mutual insurance organizations, committees of the National Board of Fire Underwriters and associations of business men and professional men that have become affiliated with the National Fire Protection Association and now constitute its long list of active members.

The principle of schedule rating has brought to every property owner information concerning the making of a fire insurance rate, and every property owner knows now the exact extent to which he, himself, is responsible for the insurance rate he pays. Moreover, every important city is informed, through reports by the engineers of the underwriters, with regard to the local conditions which affect its conflagration hazards and other fire dangers.

The growth of the movement to check the fire waste is indicated by the organizations that are giving their support to the National Fire Protection Association.

# *Safeguarding Machinery for Making Paper*

*By Edward T. Walsh, M. E.*

SINCE the advent of the workmen's compensation laws efforts have been made to eliminate hazardous conditions and safeguard the dangerous points about all machines which enter into the manufacture of paper. In some of the States the workmen are being reached and induced successfully to take an active part in the work through the organization of committees among employes, with prizes offered for acceptable suggestions, thereby leading the men to understand the importance of considering caution and safety.

That unsafe practices and conditions had arrived at a point where it was necessary to take some action toward improvement was indicated by a report on accidents in paper mills which was compiled by the Wisconsin Industrial Commission. The report covered a period of two years and a total of 5,000 employes. In that period 1,307 accidents happened, or one accident to every 4 persons employed. It was estimated that the total cost of the accidents would have amounted to more than $175,000, not including the value of each day lost. The chart shows this report arranged graphically.

It is almost impossible to eliminate some of the hazards, such as restricted working spaces around machines, but others, such as poor floors, stairs and walkways and indifferent lighting, are being remedied rapidly. The floors, etc., are being put in shape by the mechanics employed in the mills, but the lighting is being handled along scientific lines by lighting engineers.

Elevators, which were neglected heretofore and were sources of constant danger, are being equipped with safety devices, such as locks at each story, enclosures, with proper doors or approved trap doors and guard rails.

Emergency stops are being placed on or about the machines where they are handy to the reach of the operatives. The stops act directly on the engine or other motive power, and they are positive in their action. Aside from the safety to operatives, stops, like those mentioned, safeguard the machine, because it can be stopped instantly if some foreign material gets into its moving parts.

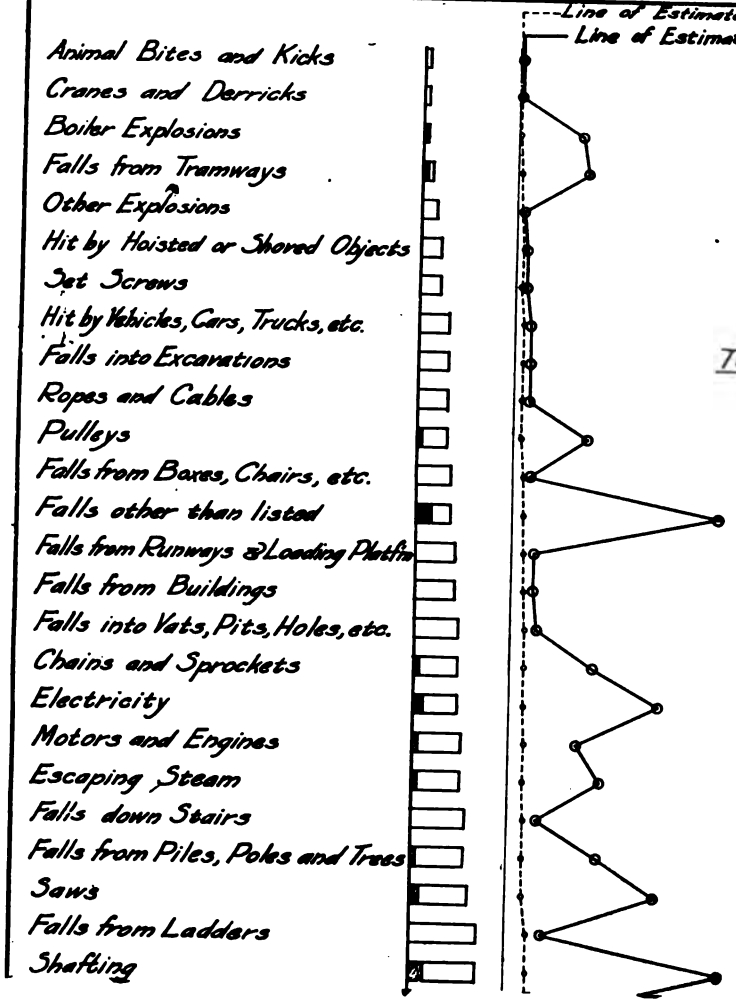
Signs reading "Keep Off! Men Working on This Machine" are displayed on machines which are being repaired.

The hazard of scuffling or horse-play is well known to all who have to do with men. There is no other source of injuries so hard to eradicate. It should be prohibited under severe penalty and the penalty exacted in the event of the breaking of the rule.

Belts, pulleys and shafting are being guarded with railings, boarding or expanded metal enclosures and gears are being enclosed completely, whether they run out or in.

To avoid turning heated liquors, steam or acids into receptacles or pipes and injuring men who may be working in or about them it should be made compulsory to sound a signal of warning. The blowing of a whistle or the ringing of a bell serves the purpose.

Ventilation is receiving more attention now than heretofore. It was found to be necessary because of the excessive moisture which gathers in and about the machine room of a paper mill and causes damaged paper. In regard to ventilating rag sorting and threshing rooms the Wisconsin Committee on Orders Covering Specific Points in Paper Mills said: "All rag sorting tables where operators stand and sort rags and other materials which throw off dust, must be equipped with an efficient exhaust system. All rag




# ACCIDENTS IN PAPER MILLS

## FROM MAY 1ST 1912 TO APR. 30TH 1914.

## WISCONSIN INDUSTRIAL COMM.

| | |
|---|---|
| Nº OF EMPLOYEES | 5000 |
| TOTAL Nº OF ACCIDENTS | 1307 |
| TOTAL COST OF ACCIDENTS | $175,032.11 (Estimated) AND 10456 DAYS |

**KEY**

- Fatal Accidents
- Permanent Injuries
- Temporary Injuries

Large Squares Equal 20 Accidents

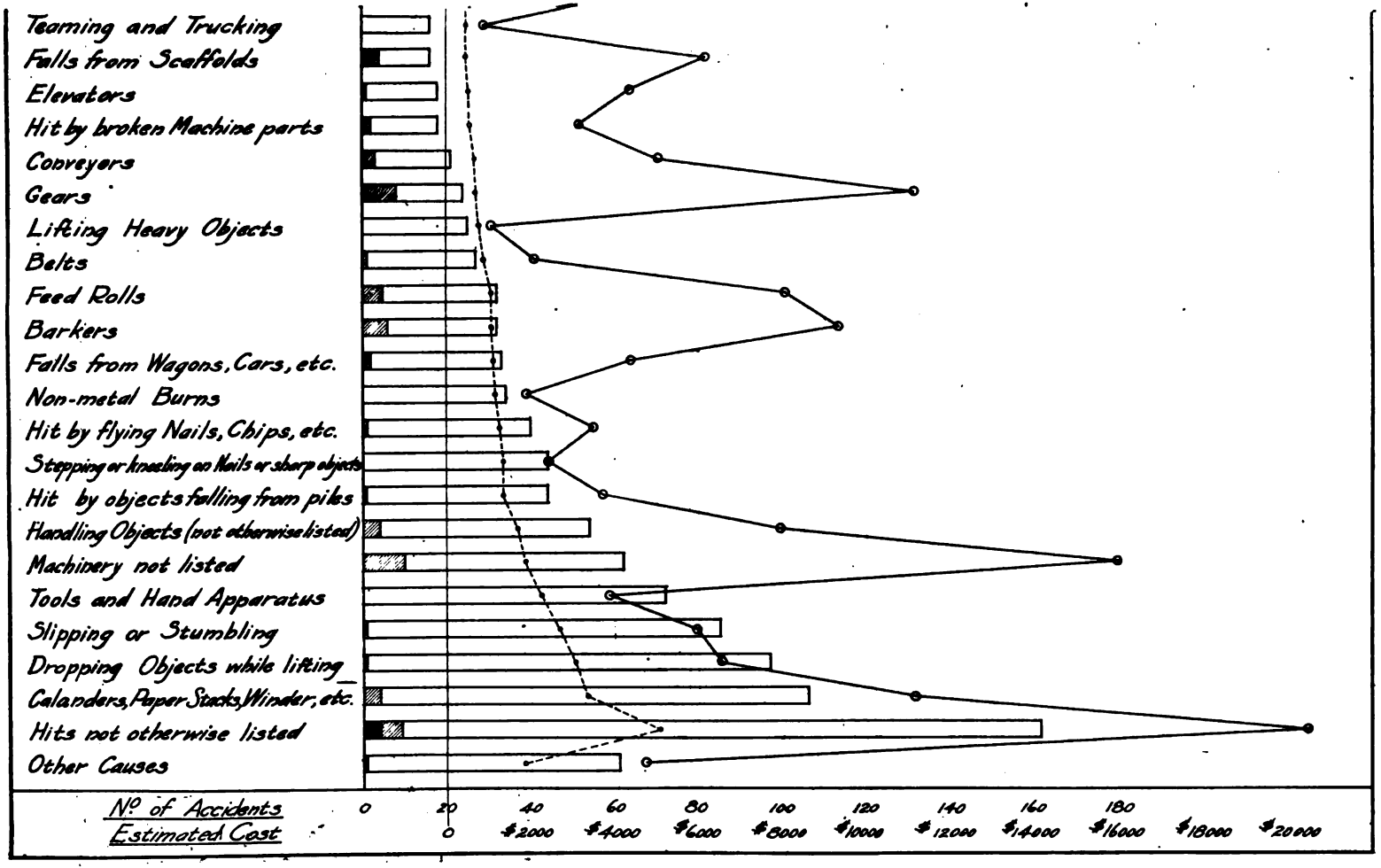

Teaming and Trucking
Falls from Scaffolds
Elevators
Hit by broken Machine parts
Conveyors
Gears
Lifting Heavy Objects
Belts
Feed Rolls
Barkers
Falls from Wagons, Cars, etc.
Non-metal Burns
Hit by flying Nails, Chips, etc.
Stepping or kneeling on Nails or sharp objects
Hit by objects falling from piles
Handling Objects (not otherwise listed)
Machinery not listed
Tools and Hand Apparatus
Slipping or Stumbling
Dropping Objects while lifting
Calanders, Paper Stacks, Winder, etc.
Hits not otherwise listed
Other Causes
No. of Accidents
Estimated Cost
0
20
40
60
80
100
120
140
160
180
0
$2000
$4000
$6000
$8000
$10000
$12000
$14000
$16000
$18000
$20000

**Fig. 1. Rag Cutting Machine, with Feeding Mechanism Guarded.**

cutting and rag threshing machines must be located in rooms separate from any rooms in which other work is being done." The committee is composed of paper mill operating men almost exclusively, and the recommendation, coming from such a source, indicates the importance of eliminating the dust hazard.

Smoking in and about a mill is prohibited usually for the work force, The rule should extend to the office force. A man who is stealing a smoke is likely to throw away the butt of his cigarette or cigar when a foreman approaches, without considering where it will land, or whether it has been extinguished or not. There is no question that the results of the habits of smoking have caused numerous fires.

Lack of management in enforcing the observance of rules for safety is a factor of accidents. Rules made in some plants become dead letters soon; the men know they can ignore them with impunity, and they do so. In other plants the operatives know that a breach of the rules means instant penalty. Foremen can be a power for good by being particular to observe all rules for safety and to direct workmen for doing the same.

In the operation of sorting rags there is practically no mechanical hazard. The sorting table should be equipped with an efficient exhaust system. The rag cutting machine offers considerable hazard from its feeding mechanism and drive. It was recognized by the manufacturer of one machine and he safeguarded his machine, as shown in Fig. 1. The sprocket chains and wheels which operate the feed rolls are housed with substantial sheet-metal guards. It might be an advantage to have the feed rolls of cutting machines covered, the cover to extend over the feed trough far enough to prevent an operative from touching the feed rolls with his hand.

**Fig. 2. Railroad Duster, with Driving Belts and Pulleys Guarded Efficiently.**

Dusting machines, rag threshers, willows, etc., offer very little hazard if the driving belts are guarded. Where conveyors are used to convey the rags from one machine to another they should have the drives guarded with wire-mesh or expanded-metal guards. Fig. 2 shows a railroad duster, with driving belts and pulleys guarded. The high quality of the guard may be noted.

If the bleach liquor used in the boilers is introduced cold, great care should be used to not to turn steam on too quickly. It is better to have the liquor heated. The worms and gears should be housed and the driving belts and pulleys guarded.

The drives of the breakers and beaters should be housed in an approved manner. Fig. 3 shows an almost ideal example of such housing. The housing over the rolls should be sturdy enough to resist the knives, if thrown out of the roll by the breaking of a band. The belts, pulleys and gears which operate the washers should be guarded.

Jordan, or refining, engines offer, in themselves, little hazard. The flexible coupling used between the motor and the engine on a direct connected unit should be enclosed entirely. The end of the shaft which extends beyond the casing should be covered with a cap.

Vertical tanks, as used for stuff chests, should have their tops 3½ feet above the floor or be boarded over with heavy plank, with guarded trap doors for access. The gears that operate the agitators should be housed so that an operative cannot put a hand or an arm near them. Operatives should be required to remove the belt which operate the agitators before they enter the tanks for any purpose. A sign on the machine will be an additional safeguard.

**Fig. 3. View of a Beating Room, Showing How the Drives of the Beaters Are Guarded.**

All pumps should have driving mechanism housed or provided with guards of approved standards.

The screens should have a guarded walkway at the sides, if they be placed close together, or a substantial one between and across the ends, if separated. The drives should be guarded.

At the back of the machine the numerous drives that operate the cyl-

inders, fourdrinier, presses, driers, calenders and reels offer problems of safeguarding. In some cases protection has been provided by placing pipe railings around the floor drives, as shown in Fig. 4. Apparently pipe rails offer an additional hazard of being torn down and thrown into the machine in the event of a broken belt, particularly where the drives are from overhead. Fig. 5 shows the floor drives enclosed in wire-mesh guards.

Fig. 4. Floor Drives at Back of Machine Enclosed by Pipe Railings.

All foot boards over the fourdrinier and presses should be equipped with handrails secured to the frames of the machines. If the rails are secured to the footboards the boards should be bolted fast, so that a man leaning against the rail will not overturn it.

Washing felts on the presses form a hazard to a considerable extent. In some mills the felts are removed and washed on a machine; duplicate felts are kept in reserve, and it takes only a short time to make the exchange. It

Fig. 5. Floor Drives of Driers, with Wire-Mesh Guards.

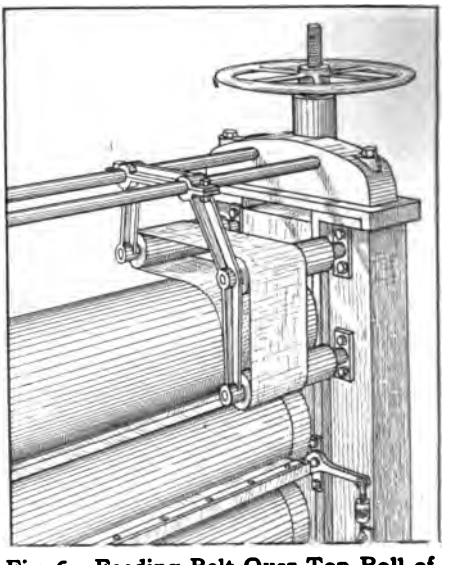


Fig. 6. Feeding Belt Over Top Roll of Calenders, to Be Used When Paper Is Fed Over Top Roll.

is claimed that changing is more economical than doing the work while the felt is on the machine. In mills where it is the practice to wash the felts on the machine it is the rule to rope and pull the felts out in front of the rolls, never behind them. The machine is run slowly and a man is at the starting lever to stop it on the instant in case of trouble.

Footboards from sill to sill of the press over the pit should be provided for use in removing the felts. It is a good practice to place footboards behind the doctors on the press rolls. They may be secured to the frame that carries the rolls.

The felt rolls on the driers should be placed at least 4½ inches away from the driers. It is understood that such placing is impossible on existing machines. The fact should be considered in the future design of driers. Such placing is particularly desirable on high speed news machines in plants.

**Fig. 7. Floor Drive for Reels, with Wire-Mesh Guard.**

**Fig. 8. Drum Winder, with Plank Up to Guard Against Nip Between Drum and Roll of Paper.**

The gears at the back of the machine which operate the driers should be housed and the arms covered with a wire-mesh guard. Oil cups, with pipes leading to the bearings, should be placed on top of the frame. Both ends of the machine should be guarded to prevent any one falling into the pit. The first felt roll should be guarded with a heavy wire-mesh guard and a guard should be placed at the baby drier, if one is on the machine. If a doctor is used on the first drier it acts

**Fig. 9. Drum Winder, with Plank Guard Down for Removal of Roll of Paper.**

**Fig. 10. Dangerous Practice of Running Cord on Winding Shaft to Cause Paper to Reel Evenly.**

as a safeguard in place of the one mentioned. The Wisconsin committee, mentioned in the foregoing, recommended this: "On all paper machines, with drier felts, each lower drier must be equipped with an efficient doctor."

After driers have been out of commission for a period care should be taken to warm them thoroughly before turning on full head of steam. The machine should be turned over slowly while steam is admitted to the drying cylinders through a cracked valve.

A substantial footboard should be provided to extend from the driers to the end of the press. It should be secured to the drier footboard in such a manner that it may be swung out of the way when not in use for leading the paper from the press to the drier.

On driers of extremely large diameter a guard rail, from frame to frame, should be provided to give security to the man passing the paper, but it should not be placed so high as to interfere with his work.

**Fig. 11. Handle on Hook of Crane Yoke to Prevent Man's Hand Being Caught Between Roll of Paper and Hook.**

**Fig. 12. Dangerous Practice of Adjusting Slitters by Hand.**

Steam pipes where men work should be covered so that if a man should catch hold of a pipe to save himself from falling he would not be compelled to let go. Aside from the point of safety to the operatives, the covering is a source of economy.

The calender stack has the reputation of being the most dangerous machine in use in the making of paper. Most of the accidents caused by the machine are of a minor nature, but many have been serious and some fatal. The paper must pass between the rolls of the machine while they are running at a very high speed. The rolls must be kept polished and the slightest particle of size or other material must be removed immediately or the finish on

the paper would be damaged. While removing the particles operatives have had their fingers caught in the rolls. Accidents happen also when they pass the paper between the rolls.

Quoting again from the recommendations of Wisconsin committee concerning calenders: "On all machine calenders used in paper mills except super-calenders, each roll must be equipped with an efficient doctor"; also, "on all machine calenders . . . where the paper is taken over the top roll to be fed into the first nip, a feeding belt or other efficient device must be provided to conduct the paper into the first nip and thus make it unnecessary for the operative to use his hands in this dangerous place."

**Fig. 13. Adjusting Slitters by Means of a Stick Provided for That Purpose.**

A feeding belt, like that specified, is shown in Fig. 6. In Germany the nips of the rolls are guarded with either an angle or round rod close to the nip, with only enough room to pass the paper through.

It is the best practice to have the reels constructed so that they may be removed from the frame for rewinding. There should be prohibition against the winding of one reel and the unwinding of another from the same frame at the same time. The committee recommended that "the winding reels used with the paper machine in paper mills,

**Fig. 14. Belts, Pulleys, Etc., Guarded on a Duplex Cutter, with Perforated Sheet-Metal Guard.**

**Fig. 15. Wire-Mesh Partition Around Duplex Cutter Gears. Partition Up and Out of the Way so That Gears Are Accessible.**

**Fig. 16. Wire-Mesh Partition Around Duplex Cutter Gears, Partition Covernig all Gears.**

where the rolls of paper run in, must be guarded or the reels must be constructed so that it is impossible to have less space than 8 inches between the reels of paper when they reach the maximum size. In order to limit the space between the reels a permanent stop may be placed below the bottom reel and above the top reel, which will limit the size of the reel."

The drives of the reels should be guarded in an approved manned. Fig. 7 shows how one mill did the work.

Where the drum and the roll of paper run in together on drum winders the nip or ingoing side must be guarded. Fig. 8 shows a winder equipped with a protecting plank to guard the nip, the plank being up. Fig. 9 shows the plank down and out of the way to allow a roll of paper to be removed.

The practice of winding a cord on the core shaft to cause the paper to reel evenly should not be permitted. Fig. 10 shows an operative in the act of using a cord. On the market is a patent collar that clamps on the shaft and keeps the paper where it belongs.

Paper may be threaded through the

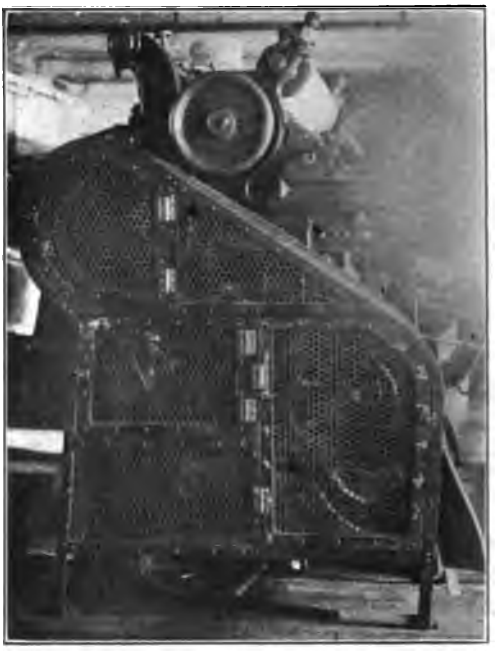


**Fig. 17. Perforated Sheet-Metal Guard on Single Cutter.**

**Fig. 18. Perforated Sheet-Metal Guard About the Gears and Drives of a Cutting Machine.**

**Fig. 19. Removable Wire-Mesh Guard Around the Gears of a Cutting Machine.**

drum winder in such a manner that the drum and the roll of paper will run out, in which event the guards at the nips may be dispensed with.

In handling the rolls of paper by means of yokes operatives sometimes get their hands injured by being caught between the hook of the yoke and the roll which slides on the winding shaft. Fig. 11 shows how the hooks on one yoke were fitted with handles to eliminate the hazard.

The practice of adjusting the slitters by hand while they are in operation, as shown in Fig. 12, should be prohibited. A stick should be provided for that purpose and the use of it insisted upon. Fig. 13 shows how the stick is used.

Boards should be placed behind the squeeze rolls of cutters and slitters so that the paper may be passed through without the danger of getting caught in the squeeze rolls.

The drives of the knife rolls on the single and duplex cutters should be guarded. Fig. 14 shows one side of a duplex cutter guarded according to one man's idea of how it should be done and Fig. 15 shows another guarded machine, with a wire-mesh partition which can be raised out of the way to get at the mechanism. The figure shows the guard out of the way and Fig. 16 shows it down, covering the gears.

Fig. 17 shows a single cutter guarded with perforated sheet-metal guards. Doors are fitted where necessary to get at the gears for adjustment. The doors are shut normally, and they must be held open. Fig. 18 shows another make of cutter, with perforated metal guard.

Fig. 19 shows another form of guard, which is held in position by sockets on the floor.

## AIR EXHAUST SYSTEMS.

Editor, SAFETY ENGINEERING:

In reference to a very interesting article entitled "Safety Through Good Ventilating Systems," by Edward T. Walsh, M. E., published in the March issue of SAFETY ENGINEERING, I would take exception to the paragraph stating that the exhaust system does not create drafts because of the air filtering into the room from many points, while the plenum system causes the air to be driven straight forward.

Both statements are true, in a measure; however, the plenum systems gives the best results because of the excess pressure in the room over that of the outside atmosphere. This creates an outward flow of the air and prohibits the entrance of cold outside air, which would otherwise strike the body, as in the exhaust system. T. W. R.

Editor, SAFETY ENGINEERING:

It was not the intention to convey the idea that no drafts could be created by the exhaust system and the plenum system was prone to produce them. The statement might have been qualified. The correspondent is right also in his contention that the plenum system gives the better results because the supply and pressure can be under better control. However, I think this latter point was made clear in my article.

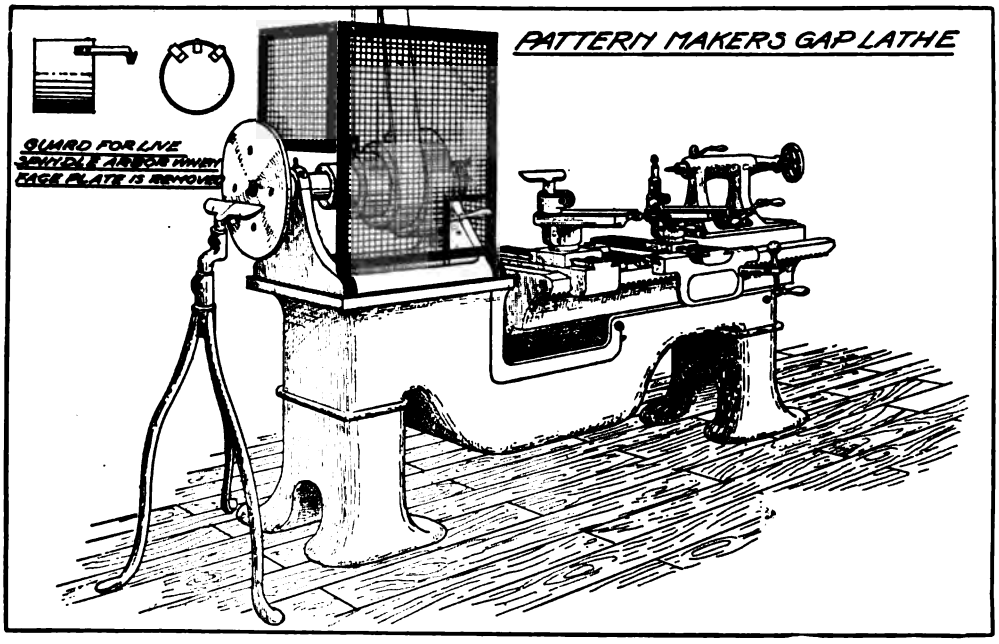
EDWARD T. WALSH, M. E.

# ELEMENTS OF SAFEGUARDING

## THE PATTERN SHOP.

*By F. W. Bail.*

THE PROBLEM of safeguarding the average pattern shop is unique among all other shops, in that nearly one-half of the needless hazard can be obviated without changing a single practice or guarding a single machine. The greatest common hazard to all pattern shops is the polished floor. If the floor is of wood, whether hard or soft, it will attain a polish that rivals the finest ball room floors, and the absurdity of neglecting this danger while guarding tools is obvious.

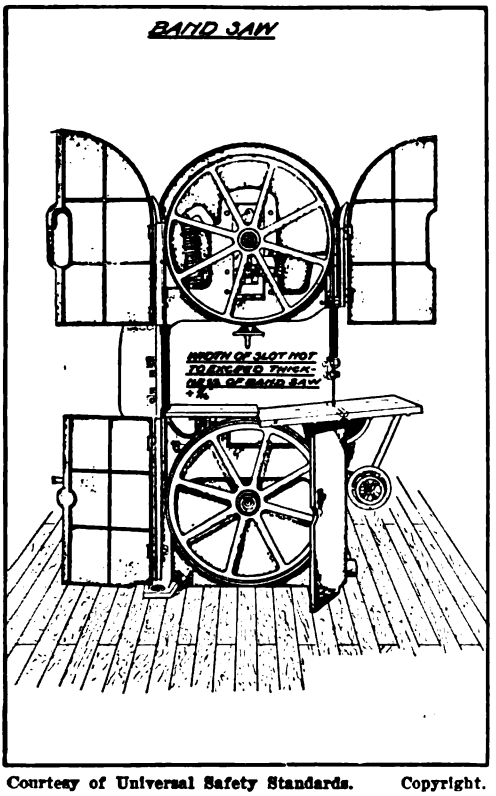



Courtesy of Universal Safety Standards. Copyright.

While there is a certain danger of a workman falling on such a surface, by far the greatest danger is a slight slip of the foot which causes a tool or the stock handled to slip; for instance, a smoothing cut on a cylinder with the heel of a skew is very easy for the experienced workman, but a slight slip of footing is quite likely to make the toe "bite," and hurl the stock at terrific speed across the shop. Such slips have caused many lacerated hands and other serious injuries, and they often cause damage to machines as well; for instance, band-saw breaks. The danger is therefore obvious, and it should be given careful attention.

The polished floor is caused, as all shop men know, by the rubbing of the saw dust, chips and shavings with an occasional drop of shellac, and since these elements of danger cannot be eliminated in a pattern shop, mechanical means must be resorted to in order to overcome it. Set-in rubber mats are good if the mats are replaced before they become frayed and form a danger in themselves. Set-in, slip-proof safety treads are better, but of course a trifle more expensive. Where a new shop is being erected, a wood block floor should certainly be specified, although asphalt and scored cement are good also.

The lathe hazard, aside from that of the belt, can be eliminated by proper shop practice and discipline. Home-



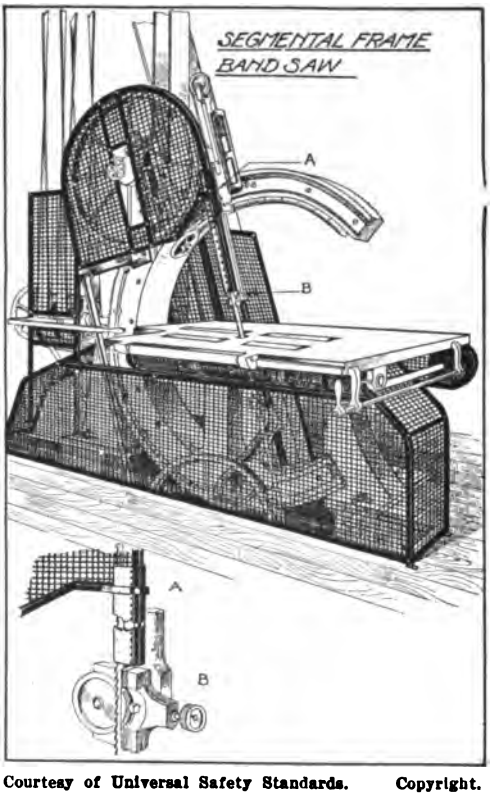

Courtesy of Universal Safety Standards. Copyright.

made chucks should be inspected by the foreman, and poorly built up chucks should not be permitted. Where projecting corners have been left on chucks, a simple band guard of sheet metal may be attached to the ways of the lathe. The live spindle end should be guarded, as shown in the accompanying drawing, when the face plate is removed, as the revolving screw threads present considerable hazard when the precaution is not taken.

A tight and loose pulley automatic locking device and cone pulley belt shifter should also be applied and the driving belt should be guarded to a height of six feet from floor level. In many technical schools the lathe tools are fastened securely to the lathe to prevent their being thrown when they "bite," but this precaution is scarcely necessary in the commercial shop where the foreman compels each workman to hold the tools properly.

The sight of a completely guarded band saw is becoming more frequent each day as the necessity of guarding them is realized. The upper and lower sheaves should be enclosed completely. The return side of the saw should be enclosed and the cutting side guarded from the upper sheave guide to the saw guide. A retaining guard of sufficient strength to withhold a broken band should be applied to the upper sheave. Segmental frame band saws should have the pits enclosed completely and all power driven gears and counterweights should be guarded. The accompanying drawing illustrates the common vertical type and the segmental frame type.

Hand planers or jointers should be equipped with the safety type or cylindrical head. The old square type can be made comparatively safe by filling in the sides, allowing holes for the adjustment of the knives. The knives should, of course, be guarded, but only guards of the automatic type should be used, as guards which require hand

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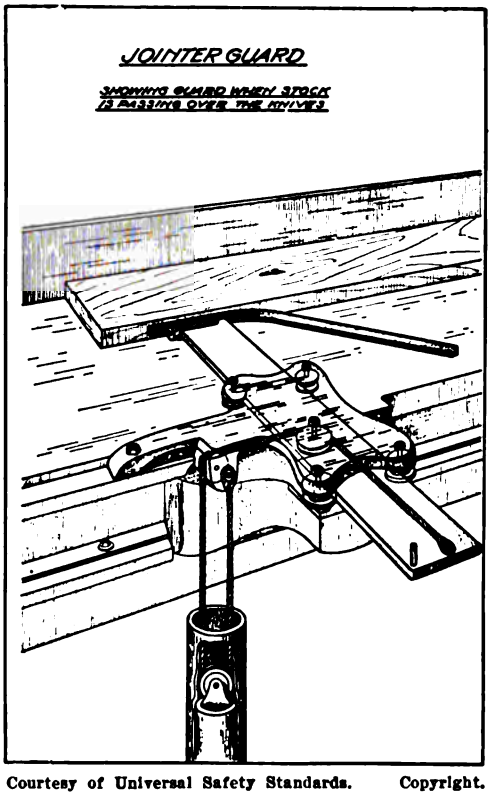


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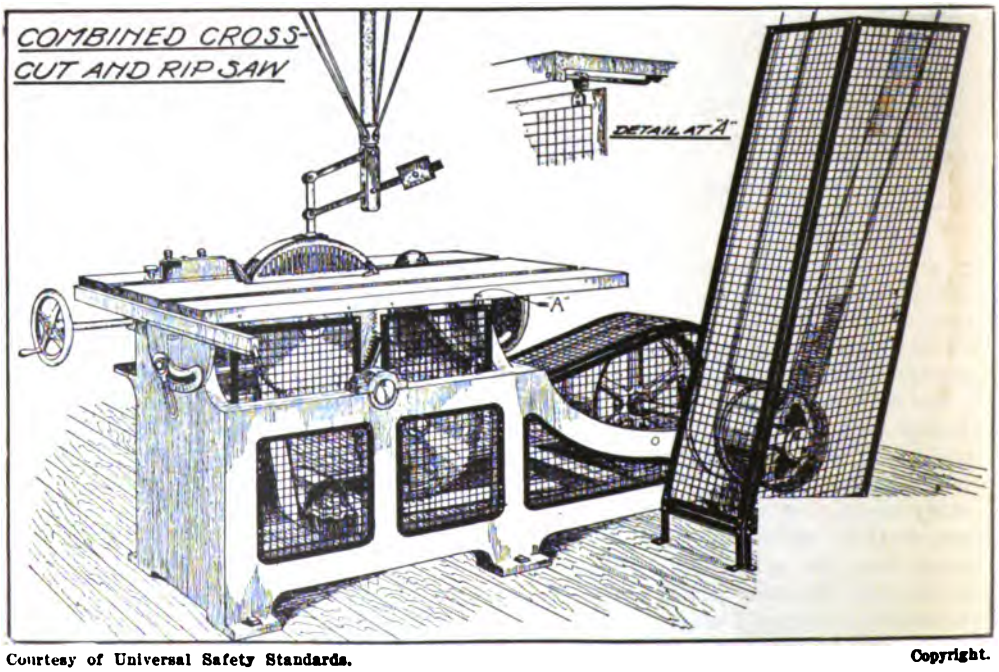
adjustment for various sizes of stock are soon neglected or discarded, and they also tend to slow up the work. There are several good types of automatic jointer guards on the market, an example of which is shown by the accompanying illustration.

To treat adequately on the circular saw would require numerous illustrations. Only the small table circular saw is treated at this time. The transmission should be guarded as shown. The saw itself should be equipped with a hood, which will serve as a guard no matter at what angle the table may be tilted and not necessitate throwing back out of the way, as is necessary to do with many guards on the market which were intended for saws with horizontal tables only. A splitter should also be set in the table to prevent "kick backs," which have often proved fatal to the operator. In addition, an adequate "kick back" attachment should be applied to the saw guard to prevent the wood from being thrown out in case the splitter does not prove sufficient. The table should be provided with a scratch line to




Courtesy of Universal Safety Standards. Copyright.

avoid the necessity of measuring from the saw. Various types of good circular saw guards are to be treated in a separate article.

The chief hazard on mortisers, core box machines and sanders is in the transmission. If the tight and loose pulley belt shifters are equipped with automatic locking devices and the belts are guarded to a height of six feet from the floor, the hazard is eliminated largely.

## ONTARIO SAFETY LEAGUE.

The work of the Ontario Safety League, that has headquarters in Toronto, is almost entirely educational for the public at large, as it is imperative continuously to reach all classes of citizens, to show them that prevention is better than cure and to have them seize that fact fully. With that end in view, the league has given most of its energy in efforts to reduce traffic accidents, at the same time, however, pointing out that accidents in the various employments may be reduced considerably by the exercise of more care.

The office of the league was opened on January 1, 1914. At the end of January the officials had sent out more than 6,000 letters to motorists, manufacturers and other users of the streets. With the letters were circulars and cards of instruction. Many manufacturers took considerable interest in the work, and they were supplied with circulars, safety notices, etc., for distribution to their employes.

The league appealed to motormen and conductors on the street cars to assist in the campaign and distributed circulars and "Safety First" buttons to about 1,800 employes of the Toronto Railway Company.

To the pupils in the schools of Toronto 150,000 "Safety First" blotters were distributed. The words of caution on the blotters reminded the children of the necessity for care, particularly on the streets. Rules for safety were printed on the covers of about 1,000,000 exercise books, note books and work books that the Board of Education distributed.

At meetings of civic and labor associations and councils, speakers from the league delivered addresses and outlined the plan of campaign for safety. At the convention of the Canadian Electrical Association in Montreal films and lantern slides were exhibited to increase the interest in the prevention of traffic and industrial accidents. The programme was repeated before the Toronto branch of the National Electric Light Association.

DON'T cross tracks without looking up and down.
DON'T "hook" a ride on wagon or sleigh, or car.
DON'T hitch your sled behind any vehicle.
DON'T skate, slide, or ride sleigh or toboggan across a street.
DON'T roller skate where there are car tracks.
DON'T play ball or running games on streets that have car tracks.
DON'T hold on to car, or wagon, or automobile, while riding a bicycle.
DON'T get off a car facing the back end of the car.
DON'T get on or off a car till it stops still.
DON'T cross the track close to the back of a car, you may be hit by a car coming in the opposite direction.
DON'T touch a loose wire hanging down on the street. Report such wires at once to a policeman or your teacher.
DON'T go near open sewers or other excavations.

Copyright 1912. F. D. Spotswood, Lexington, Ky.

Numerous notices and signs have been placed in street cars, on bill boards, in shops and at other places to direct the attention of the public to the need for more thought of safety. "Safety First" has been printed in red on poles at all stopping places of street cars throughout the city of Toronto.

The largest part of the league's campaign was commenced early in September, after preparations for visitation at public and separate schools in Toronto, with a view to teaching the pupils the value of safety for themselves and others.

The lecturers endeavored to show the children what an accident meant and how to avoid it and asked for co-operation in the work of the league to reduce the number of accidents in the streets. The lecturers talked to about 65,000 children in more than 100 schools.

The foregoing particulars appear in the first annual report of the Ontario Safety League. The concluding paragraph of the report is:

"The fatal accidents on Toronto streets show an increase for 1914 over 1913. This is unfortunate, but does not mean that our campaign has been a failure; in fact, it demonstrates the necessity for the continued existence of the league. Many public safety bodies in the United States found that their first year's work did not give any reduction in accidents, as it takes time for the public to fully realize the need for more care and caution from all classes."

## GLOVES, SHOES AND LEGGINGS.

Relating the experiences of a large plant in efforts to provide safety gloves, shoes and leggings for workmen, an official said: "There is not yet, as far as I know, a glove that is really efficient in preventing burns from molten metal. The essential elements for a really efficient glove to prevent hand burns are: That it is easy to take off quickly; that it is tight around the wrist, without pucker; that it has no seams on the surface for molten metal to catch in and stop the shedding off of the metal; that, if made of some material that is burnable, it will not break into flame and that it must be sold at no more than one dollar.

"The glove must be removable readily, so that in case of some material burning through the glove it can be removed and not incased to cause a much more severe burn than if no glove had been worn.

"The glove must be tight around the wrist, and have no opening through which the molten metal can leak, because the burn is likely to be aggravated by the molten metal and made worse than if no protection had been worn.

"The glove must be seamless, for molten metal will often be shed off a smooth surface, while the slightest obstruction will stop the shedding quality and make the metal burn through the glove.

"Obviously, the glove must be made of some material that will not burn up in a flare, like cotton or wool, but rather of some leather, through which burns may be made, but which will not go up into flames.

"The fact that the glove must be sold for one dollar or less is obvious, as certainly no workman will or can pay more than this for a glove.

"Our experience with safety leggings to prevent burns from molten metal has been extremely disappointing. As a matter of fact, we find that leggings are worse than useless, for, unless they are 100 per cent perfect, the burns that do result are worse than when no leggings are worn, because they are so difficult to take off, and they encase the burning material to the leg. We have given up the use of leggings at almost every plant.

"As to congress shoes, we have found them extremely satisfactory. The only fault thus far is that the soles wear out quite quickly, and some of the men, therefore, do not like to wear them. We are, however, getting new shoes with stronger soles. The elastics on the sides of the shoe too are likely to become loose and allow material to sift in. The only method to prevent this is to keep putting in new elastic, which, of course, makes the shoe more expensive. However, fundamentally, we find the shoes are extremely useful, and, if worn, they will cut down foot burns about 50 per cent and make the burns received very much less severe."

## STREET ACCIDENTS.

It is a fact that the public is strangely careless and on occasions surprisingly reckless. Men, women and children take unnecessary chances in crowded streets. There is too much haste and far too little calm deliberation, said the Brooklyn *Standard-Union.* Perhaps the large number of street accidents in this city and elsewhere is due chiefly to the American habit of doing things first and counting the cost afterward. That seems to be the most reasonable explanation.

# FIRST SAFETY DEVICE APPROVED BY UNDERWRITERS' LABORATORIES

[The "Safety Scaffolding" machine of the Patent Scaffolding Company has been used without a single accident in the construction of practically all of the high buildings in the United States and Canada.]

FOR the past twenty years the Underwriters' Laboratories have been testing appliances which have been manufactured for the purpose of reducing the fire hazard. Now the laboratories have begun to make a similar investigation of safety devices, the use of which will tend to decrease accidents and promote safety. The movement was begun at the third annual convention of the National Safety Council in the La Salle Hotel, Chicago, in November last, and announced at the banquet by William H. Merrill, manager of the laboratories.

The testing of devices for safety by such an eminent authority fills a long felt want, particularly in the building trades, as, due to the ever changing conditions of the construction work, the problem of lessening accidents is much more complex than in a manufacturing plant where the conditions are constant. Of course, it is not practical to test and approve all of the conditions under which construction work is carried on, but on study there are several methods and devices which can be standardized, particularly in the erection of the modern high building.

This is true in the successive stages of the construction work, from the wrecking of the old building, the caisson work for the foundations, the erection of the steel work and the scaffolding used for the construction of the walls to the time of washing down the brickwork after the completion of the building, with the intermediate steps between the stages of construction.

One of the most hazardous of the subdivisions of the construction work of a high building is the erection of scaffolding, which is very dangerous, not only to the men who put the scaffolding in place, but to the multitudes of mechanics that work on the scaffolding so furnished. Therefore, this branch of the building art soon received the close study of scaffolding experts, and, as a result, a mechanism was designed and a method of installation and operation evolved, which has afforded almost universal safety to the bricklayer and reduced the scaffolding hazard to a minimum. This device and method have been introduced and perfected by the Patent Scaffolding Company, and its machine has had the unique distinction of being the first safety device ever approved by Underwriters' Laboratories.

The device is used to support a scaffolding platform employed by masons for all kinds of exterior work on buildings, such as bricklaying, setting of window frames, decorating and cleaning.

The construction, as shown by the accompanying illustration, is very simple, having been designed to be "fool proof," as it is operated by unskilled labor. A device of this character is required, particularly when the building upon which the brick is to be laid is of any considerable height, although there is always a hazard for men working on even low buildings. Therefore, this safety device is proving itself to be valuable and economical for low structures of this description, on which it is being used more and more every day.

The design of the safety scaffolding machine affords the maximum of strength for the working loads, obtained with the minimum of weight of the mechanism itself. As this mechanism is suspended entirely from its own means of support and must carry its own weight, the weight has been reduced to a minimum consistent with a suitable factor of safety under the working conditions.

REPORT OF UNDERWRITERS' LABORATORIES.

The following extracts are from the report of the Underwriters' Laboratories, Inc., and they give an idea of the thorough investigation.

RECORD IN SERVICE.—This device has been on the market about 4 years and its service record is satisfactory.

**Looking along a safety, adjustable, suspended platform, as installed for a skyscraper. Safety scaffolding machines, at 10-foot intervals, support the continuous platform. The raising mechanism is exposed and under the constant supervision of the man working on the platform. The mechanism requires no skill for operation.**

SUITABILITY FOR USE.—A number of installations, involving the use of this device, were examined with a view to determining its suitability for use.

PROCESSES OF MANUFACTURE.—These were investigated by a representative of the laboratories and found to be satisfactory.

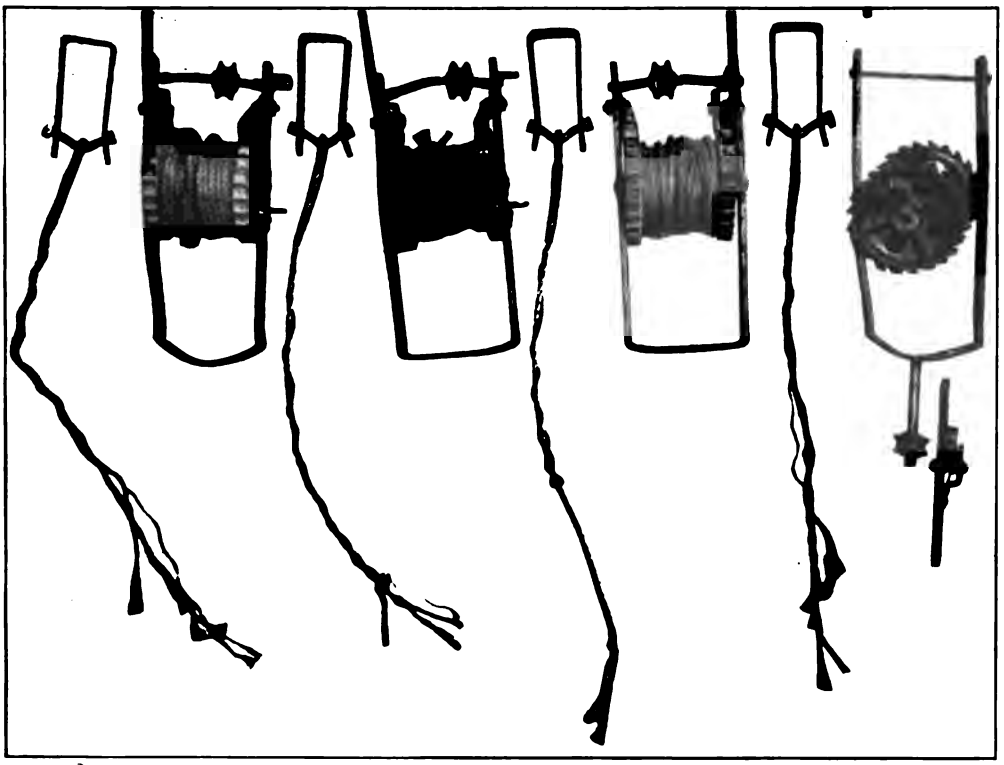
GENERAL CHARACTER.—This machine consists of two hoisting drums mounted in frames, one at each end of a special putlog composed of two angle-irons, a standard I-beam outrigger for attachment to a building and 2 flexible steel cables, the upper ends of which are attached by suitable shackles to the overhead I-beams, the lower ends being attached to the hoisting drums. These machines are installed at intervals of 8 to 10 feet along a building front and support a continuous scaffold platform resting on the angle-iron putlogs.

CONSTRUCTION.—Samples of this device were examined in the assembled condition. Other samples were taken apart and the details of construction determined.

STRENGTH.—An ultimate strength test was conducted on each of our samples of the hoisting drum, cable and shackle assembly to determine the maximum strength of this unit as well as to determine the weakest part of the assembly.

EXAMINATION AND TEST RECORD.

STRENGTH TESTS.—Test No. 1. Description of Sample: A complete assembly, consisting of a drum-frame, cable and shackle, was used



**Four drums, composing two safety scaffolding machines, after having been subjected to test. In each case the cable was the first part of the device to fail, although the other members were distorted considerably. The four U-shaped members are the shackles, which rest on the overhead steel outrigger beam. The right hand drum shows the parts that were tested individually and not as a whole.**

for this test. Method: The test specimen was mounted in a vertical tension test machine and so arranged that the tension load was applied as under practical working conditions. For this purpose a short section of I-beam was inserted in the shackle and placed on top of the upper head of the testing machine allowing the cable to hang vertically beneath it. The lower part of the drum frame was passed under two bolts spaced 7 inches on centers held in clips attached to the lower head of the testing machine. The bolt clips were blocked apart so that the bolt spacing was consistent throughout the test. These two bolts thus acted in a capacity similar to those used in clamping the drum frame between the two angles composing the putlog. A tension load was placed upon the device assembled as described above and gradually increased until failure occurred. Results: Failure occurred under a load of 12,000 pounds, the cable breaking at the part in contact with the sheave above the drum.

Test No. 2. Description of Sample: Same as for Test No. 1. Method: Same as for Test No. 1. Results: Failure occurred under a load of 11,200 pounds, the cable breaking at a point about half way between the drum and the sheave.

Test No. 3. Description of Sample: Same as for Test No. 1. Method: Same as for Test No. 1. Results: Failure occurred under a load of 11,690 pounds, the cable breaking at the part in contact with the sheave.

Test No. 4. Description of Sample: Same as for Test No. 1. Method: Same as for Test No. 1. Results: Failure occurred under a load of 12,150 pounds, the cable breaking at the part in contact with the sheave.

THE MANUFACTURER.—This manufacturer is an established concern whose factory is located at 647 West 50th street, New York, N. Y., where adequate shop facilities are provided to carry on the manufacturing, repairing and inspecting operations. The machines are installed by the manufacturer in the majority of cases and are inspected at intervals of two weeks during their use, the inspector furnishing detailed report to the user.

When the machines are returned to the factory, after having been in use, they are carefully examined, cleaned and oiled. The cables are unwound and inspected and if any strands are broken new cables substituted,

While being rewound the cables are wiped with a mixture of graphite and oil.

SUPERVISION OF PRODUCT BY THE LABORATORIES.—The manufacturer accepts our inspection service at the factory, with labeling of product which complies with specifications.

CONCLUSION.

1. CONSTRUCTION.—This device is well constructed of suitable materials

Inspection of the assembled device and of the parts indicates that the workmanship employed and the materials used for the various parts are suitable for the purpose intended.

2. STRENGTH.—This device is sufficiently strong to safely withstand the stresses to which it may be subjected in practice.

Tests on the drum cable and shackle assembly indicate that the cable, which was the weakest part of the assembly, provides a factor of safety of 5.8 based on the maximum probable loading to which the scaffold platform will subject the cables in practice.

Calculations to determine the strength of the I-beam outrigger, the anchor bolt and the putlog indicate that these members are sufficiently strong for the purpose intended.

3. DETERIORATION.—This device is suitably protected against corrosion.

All parts of the mechanism except the cables are coated with a suitable paint which protects them against excessive corrosion. The cables are kept well lubricated with a mixture of graphite and oil.

4. SUITABILITY FOR USE.—In so far as attendant hazards are concerned this device is suitable for use when properly installed and maintained.

As a result of the tests heretofore described the Underwriters' Laboratories promulgated a notice to its subscribers, reproduced herewith.

As the natural and logical consequence of the official approval of this impartial authority it is to be expected that in the near future the liability companies will allow a credit on the insurance premiums of builders using this device in their work, similar to that given by the fire insurance companies.

The following is a list of some of the notable buildings on which "Safety Scaffolding" machines have been used: Equitable Building, New York; Woolworth Building, New York; 42-story L. C. Smith Building, Seattle; 20-story Hobart Building, San Francisco; 16-story C. P. R. R. office building, Toronto; 16-story Hotel Vancouver, Vancouver; Borland Building, Chicago; North American Building, Chicago; Telephone Building, Chicago; Burlington Building, Chicago; Garland Building, Chicago; Conway Building, Chicago.

## DRESSING A BELT.

It is dangerous to dress a belt while standing close to the intake. A strumble on the belt, loose clothing caught by it, or the drawing in of a hand, may cause serious injury or death, says a bulletin of the American Steel Foundries. Stand as far as possible awav from the intake.

Guide No. 380 A 233. February 11, 1915—Laboratories' File S A 2

**Patent Scaffolding Co., The,**
**647 West 50th St., New York, N. Y.**

**Scaffolding Machine.**

Two manually-operated ratchet-controlled hoisting drums mounted in frames attached to opposite ends of double angle-iron putlog. Hoisting cables suspended from standard steel I-beam overhead outrigger and wound on drums.

**STANDARD** when subjected to loads not exceeding 1500 lbs. per cable.

**LABELED.** See description of Label Service and Label Illustration on guide card.

This card is issued by Underwriters' Laboratories.

# ORGANIZATION FOR SAFETY

*By A. C. Cook, Claims Agent, Carnegie Steel Company, Youngstown, Ohio.*

[Address delivered at a meeting of the Youngstown Local Council of the National Safety Council.]

THE SAFETY FIRST movement perhaps has received more attention throughout this country during the past few years than any other subject in which industry is interested. To one not fully familiar with the subject it would appear to be a movement of recent origin, that had sprung up suddenly.

Although the movement to reduce accidents in industrial plants probably had its origin in Europe, it is not new in this country. It is true that the movement did not become general until a few years ago; but years before that the pioneer work had been done and organizations established to facilitate the work and make it more efficient. In those days the movement was known by the homely term of "accident prevention," while it is known now by the more dignified term of "Safety First." Really the only thing new in the movement is the name, and I question if the old name did not define its purpose better.

The pioneer work consisted of the keeping of records and the thorough investigation of accidents, so that the causes could be determined definitely and means devised to prevent a recurrence of similar accidents. Foremen who had charge of the men at work were given to understand that one of their principal duties was to protect their men against injury. The investigations often revealed other places of danger where men might be injured seriously or killed, and recommendations were made to eliminate the danger.

The industrial concerns that were the pioneers in this movement having demonstrated that it was possible to reduce the number of accidents resulting in death and serious injury, thereby eliminating much suffering and sorrow, were prompted to enter the work on a much larger scale, realizing that, if such good results could be obtained from the efforts put forth, a great deal more could be expected by establishing a new department, the only excuse for existence of which would be the prevention of accidents.

In organizing for safety work the first essential must be that the owners of the business and the superintendent or manager are not only in sympathy with the movement, but that they back it and convince the workmen that they are in earnest in their efforts to prevent accidents, and that it is being done for the employes' welfare. Considerable work must be done in the line of safeguarding machinery and dangerous places before the workman can be expected to take the movement seriously and lend a helping hand to the promotion of safety.

The experience of the concerns most advanced in the work of preventing accidents has demonstrated that practically all points of danger on machines can be protected by simple guards, which will protect the men from accidental injuries and will not interfere with the operation of the machines or lower efficiency. The guards, though inexpensive, entail the expenditure of money that might not be sanctioned, were the powers that be not in hearty sympathy with the work and vitally interested in it.

The next step is the appointment by the superintendent or manager of what may be known as the General Safety Committee, composed of at least three superintendents of departments or foremen in whom he has confidence, one of whom should act as chairman, or the superintendent or manager may be a member of the committee and act as chairman. They should be charged with the general management of the safety work, under the direction of the superintendent or manager. They should make inspections of the works at regular intervals and pass on all

recommendations made by sub-committees, but should be required to make personal inspections before passing on recommendations. They should investigate accidents and where possible devise means to prevent a recurrence of similar accidents.

The committee should also draft a set of rules, giving careful consideration to the hazards of the various positions in the works, setting forth clearly the hazards, and giving specific instructions as to the safe method of performing the work. Each employe should then be furnished with a copy of the rules and instructed to read it carefully. Where men are employed who do not read English, the rules should be printed in the foreign languages so that each workman may have an opportunity to gain at once knowledge that otherwise might require years of experience to acquire.

The appointment of what may be known as sub-committees or plant committees is next in line. These committees should be composed of at least three foremen, having charge of the work in various departments, one of whom should act as chairman. The committees should make inspections of the various departments of the plant at regular intervals and make such recommendations to the general committee as, in their opinion, will best protect workmen against accidental injuries. They should also make careful inspections of points where accidents have happened and make such recommendations as in their opinion will prevent similar accidents in the future. They should work directly under the supervision of the general committee and render that committee all possible assistance. They are in a position to render especially efficient service in noting that the book of rules is not only read but its provisions understood.

Having reached this stage to insure the success of the movement, it now becomes necessary to secure the hearty co-operation of the workmen. This probably can be secured by the appointment of workmen's committees. Experience in plants where workmen's committees have been appointed has demonstrated that they have resulted in a surprising interest in safety work. The committees have been the means of proving to the workmen that the employer was really in earnest in his efforts to reduce accidents.

This recognition of the workmen and the placing of them on safety committees tends to awaken in them a sense of responsibility. Giving them an active part in the work creates an interest that has been dormant, and immediately changes their attitude toward safety work. The committees should also be composed of not less than three men, selected carefully, one of whom may act as chairman. They should be given time, and be encouraged, to make regular inspections, to talk to the men not on the committees, and get suggestions from them, and make recommendations to the general committee.

In the work of inspections and that of investigating accidents the workmen on the committees are able to determine that a large number of accidents are caused by carelessness and thoughtlessness of the men themselves, of which fact they could not be convinced in any other way. Having gained this information by their own experience, they see the light, and immediately their attitude changes from that of indifference to that of boosters for safety; and, being enthused, they talk with their fellow-workmen, giving them the benefit of their experience, and in that way become teachers of safety. Thus, by this one move, the workmen are convinced of the honesty of the employer in his effort to reduce accidents. Convinced that it is for their best interest and the interest of their families, they are ready to lend a helping hand and do what is in their power to avoid accidents.

When you stop to consider that more than one-half of the workmen in our industries are men of foreign birth, does it not seem reasonable and fair that in the appointing of committees these men should also be recognized, and that they should either be given representation on the workmen's committees or entire committees appointed

from their number and given the same duties and responsibilities as the other workmen's committees? In my opinion, it is not only a grievous mistake not to extend this recognition to them, but any organization which does not provide for the active co-operation of the workmen of foreign birth overlooks one of the very strongest arms available for defense against accidents.

Is it not true that the experience of at least the larger industries has shown that at least 75 per cent of their accidents were injuries to men of foreign birth, most of whom were not able to speak the English language? This being true, there can be no better field in which to extend the safety movement than among the foreign employes. In appointing this committee great care should be exercised to secure men who have sufficient intelligence to grasp a situation, and who know sufficient English to understand what is told them, and be better qualified to give their fellow-workmen the benefit of knowledge obtained through their new experience.

In large plants it is essential that at least one man be appointed as the safety inspector. The services of the proper man in this important position are indispensable. He is in a position which affords more opportunities for effective safety work than any one in any other position in the plant. His success in the positon he assumes is limited only by his ability to take advantage of opportunties presented. He should act as secretary to the general committee, and attend to the detail work of reports and inspections, and keep in close touch with all of the committees. He should make daily inspections of at least part of the works and visit and inspect places of danger as reported by the sub-committees, so that he will be in position to give the general committee the benefit of his opinion on various items recommended by the sub-committees when they are brought up for consideration.

In his inspections he should observe the methods employed in performing various kinds of work and, on finding that a method employed does not properly protect the men, should recommend a safer method.

In case the work is done in violation of safety rules and in a manner to place the men in immediate danger, he should be authorized to stop the work and see that safe methods are employed. He should mingle with the superintendents, foremen, and workmen, and should be able to stir up enthusiasm and be the means of converting men to the safety habit. In smaller plants where the work in hand would not justify the inspector in devoting his entire time to the work a capable man should be selected to devote to the work as many hours daily as may be required. He should, however, have duties and authority similar to those of an inspector in the larger plant.

Bulletin boards, used conservatively, and placed in the principal departments and conspicuous places, can be made sources of a great deal of interest by posting fresh material from time to time. Such matter as descriptions of accidents, clippings from newspapers, photographs showing how accidents may happen, etc., including posters furnished by the National Safety Council may be put on the bulletin boards.

At the works of the Carnegie Steel Company the accident department has for years posted on the boards a monthly bulletin, giving a comparative standing of departments and foremen, expressed in percentages and based on accidents they have experienced. In arriving at the percentage standing, the comparative hazards of the various departments and positions are taken into consideration, a comparative hazard sheet having been prepared from the actual accident experience during ten years. Bulletins that compare standing for the preceding month with that for the similar month the previous year are posted also so that the results of the safety work can be observed at a glance. As to whether or not these bulletins create any interest can probably be answered best by observing the number of calls the accident department receives, if the bulletins be a day or two late in appearing and the "kicks" from the foremen and superin-

tendents, if, in their opinion, their standing should be higher than that shown by the bulletin.

While the primary object in organizing first aid squads and drilling them in the work was to render immediate aid to the injured, it has proven to be a boon to the safety movement. It enables the men on the squads to learn something about injuries, and naturally creates in them a desire to know how the accident happened and how such accidents can be avoided in the future.

The safeguarding of machinery and dangerous places, the providing of safe methods and safe and sanitary places in which to work are very important and work along such lines has resulted in a great reduction of accidents; but educating the workman is, in my opinion, of far more importance, and it is a field of labor in which practically nothing has been done, although consistent work, in connection with the work outlined, would be productive of surprising results, and would, in my opinion, result in a much greater reduction of the number of accidents than has been obtained by the systematic protecting of machinery and providing of safe places to work.

By the safeguarding of machinery, etc., the average accident reduction experienced, I believe, can be reasonably estimated at 30 per cent, leaving 70 per cent that must be attributed to other causes. That the so-called "unavoidable accidents" do not amount to 70 per cent, I believe, can not be disputed. We should consider that only a small part of the 70 per cent should be so classed, leaving a large percentage due to other causes. What are the other causes? Some of these accidents are caused by intemperance, just what per cent we are unable to determine. Undoubtedly many of the accidents are caused by the employment of wrong methods by the workmen, carelessness and thoughtlessness of workmen for their own safety and that of fellow-employes, and the ignorance of the foreign workmen in matters pertaining to the work and his safety, in other words, the "human element."

The remedy, in my opinion, is education, and by education I mean the teaching of the men to understand that their first duty is to themselves and their families, self-preservation, and to their fellow employes and their families to protect them against injury, and that their duty to the employer, that of performing their work, is secondary. When men understand that they are expected by the employer to not only make the protection of their own lives and limbs, but those of their fellow-workmen, the first consideration, accidents will be reduced to a minimum, and not until then. I realize that this will be a harder proposition than that of safeguarding machinery. Do you think it is impossible? If you do I cannot agree with you. It will be necessary, of course, to get the confidence of the workmen so that they will understand that the employer is in earnest in this matter, as he was in the safeguarding of machines, etc., and to get this confidence it will be necessary to have the hearty co-operation of all the superiors of the workmen from the top down. With that co-operation the results that can be obtained will prove to be substantial reimbursement for the efforts expended.

The large percentage of the workmen in the steel industries being of foreign birth, the work in the plants would be more difficult and would entail the services of trusted interpreters, through whom foreigners could be instructed properly not only with reference to their work, but taught to think while at work and look out for their welfare and the welfare of others. The work would be simplified greatly if the foreigners were taught to speak and understand English. It would be ideal, obtained by the establishment of schools or club buildings with amusements, reading matter, etc., in addition to competent teaching, all of which would draw him from the saloon environment and make a better man of him, both mentally and physically, and fit him for his work. Do you believe that the foreigner chooses the saloon and its environment as his place of amusement or does he go to the saloon because it is the only place open to him?

I realize that many American citizens look on the foreign workman and his family as not only undesirable but far inferior to the American workman, not only as a workman but as a citizen, and that a certain prejudice exists against the so-called foreigner. Notwithstanding the fact that these men are obliged to work under the handicap of not being able to understand instructions given them; that the work is so entirely different from their accustomed occupation, making a great hardship, and that prejudice against them is visible on all sides, my observation has been that they have demonstrated that they can do the work just as well as their American brother. If given knowledge similar to that obtained by their American brother, I am of the opinion that it would not take them long to prove that they are not only not inferior but are superior to their boastful American brothers as workmen.

It is my opinion that if the foreigners were furnished a club house where certain amusements, baths, good reading matter and competent teaching could be obtained, affording him an opportunity to better his condition, he would no longer be found hanging around the saloon during his idle moments; he would take advantage of the opportunity and would study diligently, with the result that he would not only become more proficient in his work and better able to protect himself and others against injury, but would become a better citizen, which would certainly be a benefit to the community.

I believe the education of the foreign workmen would result in such benefit to the community and result also in the reduction of accidents to such an extent that expenses incurred in the building of community club houses would be justified. And I trust the time for serious consideration of the subject is not far distant.

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## ELEVATOR ACCIDENTS.

The latest report of the Bureau of Buildings, Borough of Manhattan, City of New York, has particulars of elevator accidents, discovered and investigated by inspectors. The distribution of the accidents, by months, was, beginning with the largest number: December, 10; January and October, 6 each; July, 5; March, April and September, 4 each; February, May and June, 3 each; August, 2.

Accidents due to the carelessness of passengers numbered 29—16 persons killed and 13 persons injured. Accidents due to the carelessness of operators numbered 9—5 persons killed and 4 persons injured.

The table of accidents:

| | |
|---|---|
| Number of accidents reported | 52 |
| Passenger elevators: | |
| Persons killed | 15 |
| Persons injured | 19 |
| Freight elevators: | |
| Persons killed | 6 |
| Persons injured | 11 |
| Sidewalk elevators: | |
| Persons killed | 3 |
| Persons injured | 9 |
| Total: | |
| Persons killed | 24 |
| Persons injured | 39 |
| Accidents without casualty | 4 |
| Accidents due to— | |
| Defects in ropes: | |
| Persons injured | 1 |
| Defects in safety devices: | |
| Persons injured | 1 |
| No casualty | 1 |
| Defects in machinery: | |
| Persons injured | 16 |
| No casualty | 3 |
| Carelessness of passengers: | |
| Persons killed | 16 |
| Persons injured | 13 |
| Carelessness of operators: | |
| Persons killed | 5 |
| Persons injured | 4 |
| Cause unknown: | |
| Persons killed | 3 |
| Persons injured | 4 |

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Experts who have studied working conditions say that three-fifths of the accidents that occur in the United States can be avoided. If this is true, it becomes a matter both of economy and humanity to install adequate safety devices and adopt practical preventive regulations.—*J. J. Sproul.*

# ALCOHOL VS. SAFETY

*By Walter Allen Rice.*

THE man who drinks, even moderately, is no longer wanted in any line of work. He is not a good risk for life insurance. He is not wanted in little or big business. The railroads and the factories will not employ the drinking man, if they know him. The man found drinking is discharged promptly. For successful work, the best results can be wrought by men who are abstainers, with level heads and sound bodies. The total abstainer is the man preferred in all the walks of life.

The remarkable growth in public sentiment in favor of total abstinence means the conservation of human life, a lengthening of the average longevity, and consequently a gradual reduction in the death rate from alcoholism. The most eminent medical authorities condemn the use of liquors in any quantity as injurious to human life.

From a business standpoint the life insurance companies and the fraternals are vitally interested in the fight to overthrow King Alcohol; for alcoholism is directly and indirectly the cause of a very large percentage of death cases which drain the mortuary funds of vast sums annually.

The dire havoc which alcohol plays with human life, and its terrible effect upon life insurance is told in the following extracts taken from a speech by a congressman, Richmond P. Hobson, in the House of Representatives on December 22, 1914:

ALCOHOL SHORTENS LIFE.

"Alcohol, even in small quantities, attacks all the vital organs and the nervous system, the tissues, and the blood. A large percentage of premature deaths arising from disease are due to this cause. The attack on the blood lowers the efficiency of the white blood corpuscles to destroy the disease germs, exposing the drinker far more than the abstainer to the ravages of consumption, pneumonia, typhoid, and other germ diseases. The records of insurance companies show that in the period from 25 to 45 the mortality of total abstainers is only a fraction of that of the average. This means that the bulk of deaths in young manhood are due to alcohol.

"The records of the insurance companies show also that a man, starting at the age of 20 as a total abstainer, lives to the average age of 65, whereas, starting at the age of 20 as a moderate drinker, he dies at 51, losing 14 years, or a cutting down of nearly one-third of his days.

"Starting at the age of 20 as a heavy drinker a man dies at 35; a sheer loss of two-thirds of the span of his whole life.

"We are dying at the rate of 1,000 per 61,000 of the population. Total abstainers in our midst are dying at the rate of 560 per 61,000 of the population, though living under the same conditions. The latter figures are those applied to adult males, as shown by the insurance companies' figures. Investigations show that the shortening of life of the offspring is far greater and more serious than that of the parent, and, since the adult males are the fathers of the young of both sexes, it is on the side of conservatism to apply the proportion to the whole population, so that we can conservatively say that 440 additional deaths are caused every year per 61,000 of the population—deaths that are premature and unnecessary. This means that alcohol actually kills fully 700,000 American citizens every year.

"When these figures were first printed they were subject to some ridicule and to many attempts to disprove them. Several German scientists have employed the same methods of reasoning and the liquor interests of the continent have a standing offer of 6,000 marks to any scientist that can disprove the figures of the great insurance companies which are the foundation of this awful conclusion.

"When the great Titanic sank in mid-ocean with her precious cargo and shocked the whole world, she carried down less than 1,600 souls. Alcohol carries down to a premature grave every day more than 2,000 American souls."

# NATIONAL SAFETY COUNCIL

*IN THIS DEPARTMENT ARE ARTICLES AND NEWS REPORTS CONCERNING THE NATIONAL SAFETY COUNCIL AND ITS LOCAL COUNCILS, FURNISHED EXCLUSIVELY TO "SAFETY ENGINEERING"*

## CHICAGO COUNCIL
### No. 3.

REGULAR meeting on April 20, City Club, with seventy members present. President H. J. Bell acted as chairman and Secretary A. W. Hitchcock recorded the minutes. The meeting opened with violin and piano music, after which President Bell apologized for the absence of F. A. Barker, who was to have acted as chairman of the "Round Table" discussion. Secretary Hitchcock assumed the chairmanship.

SAFETY FOR SMALL MANUFACTURER.—The topic of the discussion was "Safety for the Small Manufacturer: What Can the National Safety Council Do for Him?" It was taken up by Messrs. Weaver, Rosseland, T. E. Barker, Schnadig, Heelan, Worth and Bell.

Mr. Barker, Miehle Printing Press & Manufacturing Company, referred to the practice of giving watch fobs as prizes, and said that he did not use that method of arousing interest, but he had succeeded in stimulating interest just the same.

Mr. Heelan, Aetna Life Insurance Company, referred to the fact that his company did not have 5 per cent of the trouble in getting safety improvements made in large cities that they did in the smaller ones, simply because there was no "safety atmosphere" in the smaller places as compared with the large centres.

Mr. Worth, Chicago Tunnel Company, said that, to attract attention to his company's safety bulletins, baseball scores were posted regularly on all bulletin boards just above the bulletins.

President Bell then called upon Charles B. Scott, Bureau of Safety, who introduced the speaker of the evening, Dudley R. Kennedy, special agent, Youngstown Sheet & Tube Company, Youngstown, Ohio, and president of the Youngstown Council, No. 2. The subject of Mr. Kennedy's address was "The Future for Safety First." In the course of the meeting two interesting motion picture films were shown: "Safety Methods at the Eastman Kodak Company" and "The Making of a Watch," from the Elgin National Watch Company.

THE FUTURE FOR SAFETY FIRST.—In his address President Kennedy of the Youngstown Council said:

"One thing at least is certain in our minds; we can never go back to the old method of treating accidents as one of the necessary hazards of the business. We, who must progress, are scanning the horizon for other means of increasing the scope and efficiency of the work.

"Perhaps the one great outcrop, which is attracting the most attention at the present time, is that of physical examination of workmen and applicants for employment. Many concerns have been pursuing this for some time in part or in whole of their employment, but there has been so much said of late upon this subject pro and con that I can not pass the subject by without a word. In my opinion, we must have physical examination as a basic starting point.

"We have long since been educated to physical examination of applicants for life insurance. Why? We understand the necessity for, and thoroughly approve of, such examination of railroad em-

ployes. Why? Yet we have been employing hundreds and thousands and tens of thousands of men in the past, many of whom were placed in direct charge of machinery equally as dangerous to life and limb as a locomotive. Other employes, not so directly in charge, must necessarily be near, around or in such machinery and subject to its inherent or possible dangers. But, some one says, the railroad employe is entrusted with the safety of the traveling public. That is true; but when is the safety of the traveling public of more consequence than that of the working public? Should a man whose eyesight is bad, or who is deaf, be placed in any position where the failure of those faculties might endanger his co-employe?

"From another angle, should the sound and healthy workman be constantly thrown in close working association with a fellow-workman who is tubercular, who is syphilitic, who has erysipelas, or any one of a number of highly contagious or infectious diseases? In our plant, where we employ over 8,000 men, we recently discovered 75 cases of trachoma, a virulent eye disease, which is highly infectious and very dangerous, as it eventually destroys the sight, if not checked. We stamped out this budding epidemic of trachoma, with the aid of the United States Health Service, and at large expense to the company, but it is terrible to contemplate what havoc it might have wrought if it had not been severely and promptly taken in hand. I cite this as an instance of the possibilities of infection and contagion, where close proximity, personal contact or inadequate sanitary and hygienic conditions are present.

"A man who has a high blood pressure, a weak heart, predisposition to hernia, or varicose veins, should not be placed at work necessitating heavy lifting or straining. Neither should a man with tubercular tendency be placed in dusty rooms or poorly ventilated shops while there is a job in or near fresh air. Men with kidney disorders or weaknesses should not be employed in galvanizing rooms or in certain other lines of employment known to be especially harmful to those affected. The practical application of these principles under the direction of a practical doctor is, to my mind, one of the great future possibilities of the 'Safety First' movement.

"We must go still further, and I know that the suggestion will probably raise a storm of objection, much as did the first regarding physical examination. I feel that, generally speaking, every applicant for employment, whether he be an accountant or a laborer, should be subjected to a mental examination. Do you realize that often we employ for work on or near dangerous machinery men totally and woefully ignorant of the danger involved in the doing of their work? Many of you have been raised in the shop, and with the manufacturing business. You have observed, and have been a part of, the slow and gradual, but remarkable, evolution of manufacturing machinery. You have seen the electric energy harnessed to mighty machines, which do the work of many men under the old régime. With all this evolution has come increased speed, increased output, increased size of product handled, and hence greatly increased danger.

"How many of you every day in your factories place men at new work with either very little or no inquiry into their previous knowledge of a similar situation, and with little or no instruction as to methods or practice?

"Nearly every safety man preaches the gospel of thinking safety. It is indeed the keynote to the situation; but how can a man 'think safety' when he does not know how to be safe, inasmuch as he does not know where danger lies, or how it can be avoided? We have overlooked this important phase of activity too long, most of us, and it seems to me that this suggestion of a preliminary examination would give at least an idea of the magnitude of the problem of hiring safe men in the first instance.

"I can not resist this opportunity of touching upon a matter that has become, in one sense, a sort of hobby with me, and which I think is very vital to the future of 'Safety First.' I refer to the question of accident statistics and their standardization. This, of course, has been a much mooted question, and still

we have no semblance of uniformity in the statistics which various employers and governmental agencies are foisting upon us from time to time.

"I will read a letter, which I wrote to Mr. Cameron, secretary of the National Safety Council, two or three weeks ago, which explains my ideas on the subject and what I should like to submit for your approval and suggestion:

As you are aware, there has been considerable agitation for some time for some standard form of compiling accident statistics. The writer, in an address delivered at the last Safety Congress, made some suggestions along this line, which apparently struck a responsive chord, inasmuch as I have had several letters from prominent safety men, complimenting me upon my idea and recommending that I prepare my plan in detail and submit it to the National Council for action, the idea, of course, being that, if satisfactory, it should be adopted as the standard method for obtaining accident reduction statistics. The proposed plan is as follows:

The whole scheme hinges upon the comparison between days actually worked by all men in a given plant for a given time, and the number of days lost through accidents in the above-mentioned time. For illustration: If a certain steel works employed on the average of 2,000 men in 1914, and assuming that they worked 300 days, our primary figure of days worked would be 600,000 plant or work days, expressed in the equation of one man's time. With this figure in mind, it would be easy to ascertain the percentage of lost days due to accidents.

It would be necessary, of course, to arrive at an arbitrary method of defining and computing time lost. This I would propose doing in the following manner: First, dividing all accidents into two classes, to be known as first aid, and, second, lost time accidents. First aid would be defined as any accident requiring first aid attention not occasioning one full day's lost time. Second, lost time accidents would be defined as any accident causing loss of one or more full day's time.

The plan contemplates the further penalization, according to the following table, which, although it might be termed an arbitrary table, was arrived at by taking the compensation acts of all the States and computing the average number of days of compensation allowed for the various scheduled injuries:

TABLE.

Death occurring immediately after the accident, or within two years thereof, directly attributable to the injury, 2,000 days. In case death did not occur for some time after injury, the number of days thus lived should be deducted from the penalty.

Total disability should be defined as the loss of either two eyes, two feet, two hands or any two thereof, or spinal injuries causing total disability, and should be charged with 2,000 days.

The loss of a hand below the elbow, 1,000 days.

The loss of an arm at or above the elbow, 1,300 days.

The loss of an eye, 700 days.

The loss of a foot below the knee, 850 days.

The loss of a leg at or above the knee, 1,200 days.

All other accidents to be charged with the number of days actually lost pending the return of the man to work.

Of course, it would be possible to go into much more detail and to further specify many other injuries, but, inasmuch as the above are the generally accepted major injuries, it seems to me that if all agreed on the standard, whatever it might be, the above would give us an honest and fairly workable means of determining what honest progress we were making in accident prevention.

It is true, of course, that hazards vary in different industries, but for comparative purposes statistics computed upon the above basis would, in my opinion, give more nearly a true reflection of the experience of any plant or division thereof in terms familiar to every one who is interested in the safety movement, and who is willing to accept some such standard as this for the general good and our mutual education and enlightenment.

"As I said in the beginning, it is not a question of 'Will we go forward?' but rather 'How will we proceed?' We will from time to time devise new methods, of course, but we have now gone so far that any startling revolutionary methods are almost out of the question. We must recharge our enthusiasm constantly. We must keep our hearts in the humanitarian end of the game, we must educate our employers, the employes, and, above all, ourselves.

"We must teach co-operation of the men on the job, and we must practice what we preach among ourselves. We must make the most of the wonderful inherent possibilities of our parent organization, the National Safety Council, a thing which many of us neglect to do, and I regret exceedingly to admit it. We cannot expect the officers to carry the burden alone, for they, competent, hardworking, loyal and enthusiastic as they are, cannot succeed in great measure unless we tender them our help and co-operation. There are still thousands and tens of thousands of prospective members who have not come into the fold. We must bring them in and increase the weight and strength of the

organization for our mutual advantage.

"We must encourage and comply honestly with advancing progressive legislation upon safeguarding machinery, and upon legislation governing the sanitation and hygiene of working places. We have promised much to labor and we must prove our good faith with them by fulfilling with good measure our promises.

"While I give due place to the economic value and the efficiency side of accident prevention, I maintain that it is only through the heart appeal, the humanitarian side, that the matter will do its greatest good or will obtain the active and hearty sympathy and co-operation of the rank and file of the men.

"We are working in Ohio on a set of safety standards, or rules to govern shops and factories, which rules, when passed, will have the force and effect of laws. We have assurance from New York and Pennsylvania that they are anxious to co-operate with us in formulating a set of laws for the three States, uniform, if possible, or at least almost so, in order that a concern having plants in the three States can adopt a standard device which will meet all general requirements. So, too, will workmen, going to a new State, be more familiar with newly adopted mechanisms and standards. Should this plan prove feasible, such standards would doubtless be generally adopted within a short time in many States.

"When I have gone thus far I am constrained to admit that, generally speaking, the future is somewhat hazy in perspective; but I know, and upon it I bank my faith, that your enthusiasm, fresh and constant as the mountain brook, will sustain you and drive you on and up; that in the ascent you will acquire added courage and conviction; that revelations will be made and seeming miracles unveiled; that you will ultimately reap a vast and soul satisfying reward in the spectacle of human happiness, sound bodies, contented minds and an approximate solution of that greatest of all problems, that of capital and labor."

Mr. Kennedy repeated his remarks at a meeting of Detroit Council.

## YOUNGSTOWN COUNCIL
### No. 2.

MEETING on April 20. Vice-President E. J. Warnock acted as chairman and N. W. Kistler recorded the minutes. Eighteen members present. A letter was read from Secretary Woltz, informing the members that the open dinner meeting in the Ohio Hotel on March 30 was a marked success, and that many who attended had suggested to him that the dinner meetings be held more frequently. The letter mentioned the meeting in Sharon, Pa., by members of the local council resident there, and said that about 800 persons had attended.

Secretary Woltz reported also that President Kennedy had addressed a meeting of the Detroit Council on April 15; and that he (Secretary Woltz) had talked at a meeting of the Board of Commerce of Toledo, Ohio, on April 12; furthermore, that he had been requested to address a meeting of the San Francisco Council.

BOILER RULES.—Mr. McMasters, chairman of the committee that was appointed to submit rules relative to portable boilers, indicated that the State boiler inspector had endorsed the specifications of the American Society Boiler Code. It was agreed to accept the code of specifications as a submission from the committee, and to discuss and take action on the point at the next meeting.

REPORTABLE ACCIDENTS.—Mr. Greenwood read the report of the committee that was appointed to answer the question, "What is a reportable accident?" He then indicated that President Kennedy suggested that accidents be classified according to time lost, and that an accident which caused the loss of only one day's time be classed as trivial. Mr. Greenwood gave it as his opinion that the classification would not be fair, because, if one plant had 500 trivial accidents which caused no loss of time and another plant had 500 which caused a loss of one day each, the 500 lost-day accidents would be rated the same as the 500 which caused no lost time; also that the hazardous element connected with the different classes of work varied.

and the steel making and mining industries, which have a high hazard, with a ratio of 1 to 25, would be compared with the furniture-making and other industries, which have a ratio of 1 to 10.

After a long discussion on the report the members agreed that the report be returned to the committee, with the request that it explain more fully what constitutes a "minor injury"; that the second-class injury be classified under three divisions, the third division to include total disabilities and fatal injuries; and that the last paragraph be eliminated.

Mr. Jacksteimer indicated that it would be a good idea for the local council to have regular meetings occasionally in Sharon in order to increase enthusiasm; and it was agreed to endeavor to arrange for the meetings.

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## LEHIGH VALLEY COUNCIL NO. 5.

IT HAS BEEN the policy of Lehigh Valley Council to have a large public safety meeting in the early part of spring. Accordingly the council made its second public appearance in Allentown on Wednesday, April 21, in the Lyric Theater. Tickets of admission were distributed for the meeting and the theater was well filled.

PRESIDENT CAMPBELL'S ADDRESS.—The public had the unusual opportunity of hearing two very able men deliver addresses. The first speaker was R. W. Campbell, president of the National Safety Council, and the second speaker was J. P. Jackson, commissioner, Department of Labor and Industry of Pennsylvania. Mr. Campbell addressed the meeting on "The Personal Element in Accident Prevention." He commented on the large attendance and congratulated the local council for its efforts in making the meeting possible.

In leading up to his subject, Mr. Campbell used several interesting slides, showing the importance of educating workmen and employers to the importance of greater activity and constant application in the work of accident prevention. An outline was presented, showing the force of the work of the Illinois Steel Company. Statistical charts were of general interest, and they emphasized the importance of systematic methods, which were the results of proper organization.

Mr. Campbell told of the importance of getting into personal touch with the situation and making the workmen feel that there is a "personal element" entering into the work, which is calculated to benefit and better working conditions in general. "The progress along these lines since 1912," he said, "has been almost unbelievable, but many problems are unsolved, and the work, which has been started so enthusiastically, must go on."

He explained the work of the National Safety Council and indicated how the organization was helping to build up a new interest in humanitarian methods of doing work. The rapid growth of the National Safety Council, he said, was gratifying, and it showed that the efforts of those engaged in the work were appreciated by employers of labor throughout the country.

COMMISSIONER JACKSON'S ADDRESS.—Commissioner Jackson spoke on "Industrial Accidents and Best Methods of Prevention." He brought before the meeting very forcibly the importance of co-operation between the Department of Labor and Industry and the manufacturers in the State. Stress was placed on the safeguarding of machinery and other hazards in the various industries. Proper lighting, health of employes, fire escapes, protection of fire doors, fire walls and exits in factories, were pointed out as some of the features of great importance in any work for accident prevention.

The commissioner said that he had great faith in the extension schools for industrial education and the results which would be accomplished by the adoption of the system. The schools of Germany were mentioned, Mr. Jackson having had the privilege of visiting these schools and studying their methods last year.

"These schools," he said, "will do more

to correct the unnecessary waste of life by accidents than anything I know of. Boys and girls educated in these schools are efficient, careful workers, and in Germany they are drilled in methods of taking care of themselves and doing their work in the safe way."

He mentioned the Stephens Extension School of Allentown and congratulated the city on its foresight and good sense in establishing a school of that type. He said he was convinced of the value of the kind of education, especially in industrial centers, and he expressed the hope that in a short time laws would be enacted to require the permanent establishment of extension schools.

Four reels of pictures rounded out the meeting, the films holding the interest of those present, and good seed was sown. The films were: "The Workman's Lesson," "The Crime of Carelessness," "The Man He Might Have Been" and "Locomotive Smash-up." The last film was of general interest, because it showed clearly the effect of two locomotives coming together, each attached to trains of wooden cars. The film spoke for itself and condemned the use of the old type of wooden rolling stock.

## PITTSBURGH COUNCIL NO. 6.

REGULAR monthly meeting on April 2 in Thaw Hall, University of Pittsburgh; about one hundred present. C. B. Auel, Director of Standards, Processes and Materials, Westinghouse Electric & Manufacturing Company, East Pittsburgh, acted as chairman and Secretary G. W. Case recorded the minutes.

SAFETY WORK OF THE CARNEGIE STEEL COMPANY.—A lantern-slide talk on this subject was given by L. H. Burnett, assistant to the president of the Carnegie Steel Company. The part of Mr. Burnett's address, which covered all phases of the accident prevention activity at his company's plants, dealing with welfare work, seemed to create the most enthusiasm. He indicated how much benefit the children were receiving from such activity for accident prevention.

Following Mr. Burnett's talk, two motion-picture reels, made at the Carnegie Steel Company's works, were shown. The films portrayed the children making gardens, playing in the well-equipped playgrounds belonging to the company, and swimming races in the swimming pools.

THE ORGANIZATION FOR SAFETY.—A "Round Table" discussion was on this subject. The particular question which received the most attention was how to overcome the carelessness exhibited by so many men in working at plants. It seemed to be the sense of the meeting that, for success, the form of organization depended very largely upon the men and in great part upon the personality of the men whose actions would be affected by safety work. Therefore, in order that safety work at the plant of any company may be successful, it is necessary to study the conditions surrounding the workmen and, through experiment, to develop gradually an operating plan to achieve results.

The following-named members were appointed as a committee to collate certain data to further the practical scope of the local council's work: C. B. Auel, Westinghouse Electric & Manufacturing Company, chairman; F. P. Feehan, chief factory inspector for the Pittsburgh district; C. E. Ralston, Jones & Laughlin Steel Company; E. M. Peake, Carnegie Steel Company.

## DETROIT COUNCIL NO. 8.

MEETING on April 15 in the dining room of the Board of Commerce, Lafayette and Shelby streets; about 100 present. Dudley R. Kennedy, special agent, Youngstown Sheet & Tube Company, Youngstown, Ohio, and president of the local council, was the principal speaker. His topic was "The Future for Safety First." His address appears in the report of Chicago Council.

The subjects of a "Round Table" discussion were: "Co-operation in Cutting Out Dangerous Practices" and "Co-operation Through Bulletin Boards."

## ROCHESTER COUNCIL NO. 9.

THE EXECUTIVE committee of the council had a meeting on April 23. Ten members were present. President J. A. Robertson acted as chairman and the minutes were recorded by Charles E. Hall.

JUNIOR SAFETY COUNCIL.—The committee was informed that the plan for forming a Junior Safety Council within the Rochester Chamber Local Council had been presented to the officers of the Rochester Chamber of Commerce, who had voted to give it their hearty support.

The committee was advised that the officers suggested that the matter of financing the Junior Safety Council be undertaken by the Rochester Chamber Local Council, and that any necessary assistance would be rendered gladly by the officers.

President Robertson announced the appointment of the following ways and means committee to finance the Junior Safety Council plan: Messrs. Fuller, chairman, L. M. Todd and John F. Forbes.

Then followed a discussion on the possibilities of having the plan for reaching school children in accident prevention financed by the city government in coming years. Those present shared the belief of President Robertson that the local council must first undertake to popularize a plan to such an extent that the city would feel itself justified in the public eye in stepping in and adopting the plan as its own in schools.

The executive committee authorized President Robertson to confer with the proprietors of the Rochester daily newspapers in an effort to have them reproduce meritorious cuts and material received with the weekly distributions of safety literature from the National Safety Council.

ROUND TABLE DISCUSSIONS. — Ways and means for arousing more interest, so that a greater attendance could be secured for "Round Table" meetings of the council, were discussed. The decision was that each firm represented in the local council be asked to furnish a list of factory foremen and employes interested in safety work, to whom invitations might be despatched to attend the "Round Table" discussions.

The programme committee was instructed to arrange for a "Round Table" discussion of the entire local council on some night between May 24 and May 30.

PLAN FOR SAFETY CAMPAIGN.—The following is an outline of the plan of the Rochester Chamber Council to stimulate safety in the public schools under the Junior Safety Council:

The Safety Council of the Chamber of Commerce of Rochester, has broadened the scope of its 1915 campaign to include the public schools. Since 1910 accident prevention committees, that were succeeded by the local council in May, 1914, have been seeking an opening wedge that would lead to tangible and satisfactory accident prevention work in the schools. Teachers and principals offered the only available medium through which to work, and the committees have been so occupied with other pressing matters that a systematic and intensive campaign could not be introduced until this year.

There are about 40 public schools in Rochester, in 33 of which are well organized boys' clubs. The membership of each club is limited to 30, chosen for the influence they exercise with the rest of the pupils in the school. They are the older children above the sixth grades, and by their popularity and prowess in sports and studies they occupy positions high in the estimation of the juvenile community. Due to the leadership of Herman J. Norton, Supervisor of Physical Education, the youngsters' unbounded energies find a wholesome outlet. The influence on the balance of the school has been of an excellent nature.

To illustrate the potentialities in accident prevention, this occurrence should be cited. Some time ago a pupil was killed in a traffic accident near the public school in Joseph avenue. Without suggestion from outside sources, the Boys' Club formed a safety committee whose members stationed themselves at corners in the neighborhood of the school and guarded the children coming and departing. The committee continued in office until the summer vacation.

Rochester manufacturers in the local council see in these clubs an opportunity long sought for conducting accident prevention in the schools along the practical and efficient lines of industrial "Safety First" campaign. To keep the boys interested and to show them a tangible method of procedure, a Junior Safety Council will be organized.

Each club has designated a safety committee of six members, who are to represent their fellows in the Junior Safety Council. They are to meet monthly at the Chamber of Commerce in the interests of their campaign.

The secret of the plan is the placing of responsibility on the shoulders of the boys. They

have been impressed with the fact that they are working with and not for the biggest manufacturers of Rochester, who expect the junior council to "make good." The adoption of by-laws and the election of officers and committees from their own ranks are likely to impress the idea of responsibility.

The boys have had training in addressing chairmen from the floor, and they dote on strict parliamentary procedure, to follow which they will receive every opportunity in the junior council.

The first meeting of the safety committees was on Monday evening, April 26, in the assembly hall of the Chamber of Commerce. At a previous meeting of the 1,000 members of all clubs at East High School the boys had been advised that they would be called upon for reports, covering their experience with actual accidents. The oratory and spirited debate of the youngsters astonished and gratified the adults present. "You had but to look into their eyes," said President J. A. Robertson, of the local council, "to become assured of the plan's success." They were alive to the purpose of the council and campaign, and gave lucid descriptions of actual accidents. Some of them are moralizers of a high order, as was demonstrated when they dwelt on conduct and deportment that would have rendered such accidents impossible of occurrence.

Each week the council will send out safety literature, giving bare descriptions of actual accidents to boys. Members of the safety committee will discuss the accidents at regular meetings of their clubs, and they will be asked to keep constantly on the alert to note and report hazardous conditions and traffic violations throughout the city. These reports will be taken up by the local council with the proper authorities.

The boys cannot be expected to carry a peak load of interest in the campaign through its merits alone. Their efforts will be rewarded with buttons and medals awarded by the local council. Every one, young or old, is susceptible to newspaper publicity, which with the buttons and medals should sustain interest indefinitely. A budget of about $600 will be required to run the campaign, further particulars of which will be furnished other local councils interested.

It is expected that the good effects of the campaign will not be confined to the boys, but will be felt in the homes and factories. The value of the movement, however, lies in its effect upon the coming generations. Rochester manufacturers believe that the child of today trained in accident prevention is the careful citizen of tomorrow.

## GRAND RAPIDS COUNCIL NO. 13.

MEETING in the Morton House, April 13, was attended by about 150 managers, superintendents, and foremen of local concerns, and also by representatives from Traverse City, Cadillac and Muskegon. The meeting was preceded by a dinner.

President E. K. Prichett took charge of the meeting. He spoke on accident prevention and related particulars of the activities of the local council since its organization. He introduced C. W. Price, assistant to the Industrial Commission of Wisconsin, who gave an interesting and instructive discourse on accident prevention, chiefly in Wisconsin, with statistics to bear out his statements.

ADDRESS OF C. W. PRICE.—The idea of accident prevention was first originated and carried out by the Illinois Steel Company, one of the subsidiaries of the United States Steel Corporation. Everyone thought it a hazy idea at first and a good deal of a fad. Mr. Price could remember when he started the work for the Harvester Company that the one desire was to get a figure that told what could be done in reducing deaths and serious injuries; so it was with great pleasure that they received the first figure from the Illinois Steel Company, showing that they had been able to reduce accidents 65 per cent.

During the seven years from 1906 to the end of 1913, the United States Steel Corporation has saved 11,074 men from being killed or seriously injured out of a total of 250,000 which it employed during that time, as a result of the safety work. The fact that so small a per cent of the hazards can be covered by guards makes the figures doubly significant.

At the plant of the Wisconsin Steel Company, a subsidiary company of the International Harvester Company, four men were killed and 55 seriously injured in 1910, and 3,200 men lost 92,000 hours on account of injury. The company then started the accident prevention movement, beginning where the Illinois Steel company left off, assuming the methods to be right, and in 1914 one man, instead of four men, was killed, 19 men, instead of 55 men, were injured, and 49,000 hours, instead of 92,000 hours, were lost. Besides this it saved $2,300 in money. Since 1910 the company has reduced the injuries and deaths 68 per cent, and it is still going.

The most remarkable experience in Wisconsin is that of the Milwaukee Coke & Gas Company. It employs about 525 men in Milwaukee, mostly foreigners. About 100 of these men work on the ovens, which is hazardous work. In 1912 6,600 days were lost through injury. Then the company organized a safety committee and started safety work. The result was that, in 1914, 2,300 days were lost, instead of 6,600, a reduction of nearly two-thirds, and a larger reduction was made in serious injuries. Ninety per cent of this work has been accomplished in reaching the workmen and making them interested, because such a large number of the hazards were beyond the reach of guards.

The Fairbanks-Morse Company has succeeded by its safety work in reducing the accidents 75 per cent, while the Allis Chalmers Company has reduced accidents about two-thirds. The Allis-Chalmers Company has also reduced its insurance rate from $4 per $100 payroll to 53 cents, covering compensation and medical service. In June, 1913, every man in the Pullman Company lost an average of 48 minutes on account of injury. In May, 1914, this was cut down to 14 minutes.

Wisconsin manufacturers have reduced death cases and serious injuries about one-half. Figures of accidents happening on machines show that they have been reduced from over 36 per cent of all accidents to 18½ per cent. Of 250 companies in Wisconsin, statistics show that, with the exception of 11 logging concerns and 15 factories, every one is making a good record in time lost. The insurance, if based on actual loss, would be 30 cents per $100 payroll.

Four years ago the Chicago & Northwestern Railroad started the accident prevention movement after the methods employed by the Illinois Steel Company. It succeeded in reducing the death cases one-third and those of injuries one-fourth.

All companies agree that not more than one-third of what they have accomplished has been accomplished by guards. Two-thirds has been done by reaching the workmen, getting them interested intelligently in safety.

Mr. Price displayed a blueprint of a period of 13 months that showed the causes of all accidents. Some of the figures were: 2,511 men injured on machines and machines' parts (the majority of these accidents might have been prevented); 5,336 men injured by being hit by falling objects and by falls. The four big ways to injuries in Wisconsin outside of machines are: Men falling from high places; things falling from high places on men; men dropping heavy things; handling hand tools. In two years 500 men were injured while cleaning machines in motion.

ROUND TABLE DISCUSSION.—President Prichett turned the meeting into a "Round Table" discussion. Mr. Walker, of the Powers & Walker Casket Company, said that his company had done all it could in its plant to promote safety. It uses the bulletins and literature of the National Safety Council and the employes have all become interested. One picture bulletin in particular, showing the awful result of a simple scratch which became infected, has caused all of the employes to give immediate attention to all minor injuries.

M. B. Baldwin, of Baldwin, Tuthill & Bolton, said that accidents were few in his plant, and he was not able to recall the loss of a hand, an eye, or a finger in the last seven years. The small number of accidents is due largely to the fact that the firm has no rapidly revolving machines. The grade of the intelligence of the workmen is rather high. They have an active "Safety First" committee which meets every two weeks. The men seem to appreciate the spirit of the work, and they are very much interested. They also have a suggestion box and a bulletin board.

Mr. Thwing, of the Grand Rapids Veneer Works, said that an insurance inspector remarked recently that they had the safest plant in Grand Rapids. Since starting their safety work, the accidents have almost ceased; they have only had a couple of fingers scratched since January. Formerly they had very serious accidents frequently. He stated that they could accomplish most by interesting their men and inducing them to be careful.

Mr. Greilick, of Traverse City, said that since the first of the year his concern had been doing safety work on its own initiative. It has three different committees, one to consider efficiency ideas, another to consider shop betterment, and the third for "Safety First." He remarked that, on looking over the reports of the three committees, it seemed quite remarkable to him to notice that the efficiency suggestions were most always "Safety First" suggestions; the "Safety First" suggestions were for efficiency, and the shop betterment suggestions were for both. It was plain to him that only one committee was needed, as all had resolved themselves into the safety committee. Mr. Greilick was strongly of the opinion that the workmen should be interested in safety work and allowed to make suggestions.

Mr. Thompson, of the St. Johns Table Company, Cadillac, was called upon for his views in regard to safety work. He said that about two and one-half years ago his concern started a campaign. It has two safety committees, bulletin boards, and a local insurance organization. It gets suggestions from the employes and it has awakened considerable interest among them. It is evident that, as time progresses, the suggestions are more limited and the education of the employes along safety lines is the only ground left to work on.

Mr. Thompson remarked that the work along safety lines reduced materially the insurance rates. At the time when the compensation law went into effect, the rate for his company was prohibitive, and it carried its own insurance for a year. By the safety work in protecting the machines, educating the employes, etc., it had been able in two years to reduce the rate nearly 50 per cent.

John D. Raab, of the John D. Raab Chair Company, said that his company had just built and equipped a modern, safeguarded plant. Besides guarding all machines and hazardous places, it had given ample consideration to light. That, in Mr. Raab's opinion, was perhaps as important as guards. If a man can see what he is doing and where he is going, he is not nearly so liable to injury as if he is working in the dark at a plant.

For a few days prior and subsequent to the meeting of the Grand Rapids Council, Foster, Stevens & Co., hardware dealers, maintained a safety exhibit in the show-windows. The exhibit attracted much attention and aroused interest in the activities of the Grand Rapids Safety Council.

The exhibitors and the items on view:

Phoenix Sprinkler & Heating Company, automatic sprinkler system.

American Seating Company, safety signs and placards, shoes and leggings for molders, first aid jar.

C. O. Porter Machinery Company, safety planer cylinder and saw guards, shaper guard, and jointer guard.

Oliver Machinery Company, saw guard, photograph.

Grand Rapids-Muskegon Power Company, pulmotor, rubber gloves, rubber cable insulator.

F. H. McDonald, ladder shoes.

The Carborundum Company, safety flanges for grinding wheels.

Valley City Machine Works, grinding stand with safety protection hoods.

National Safety Council, bulletins and signs.

## NEW YORK COUNCIL NO. 14.

FIRST regular meeting on April 20. President Marcus A. Dow acted as chairman and Secretary L. A. Larsen recorded the minutes.

THE WORK OF THE NATIONAL SAFETY COUNCIL.—This was the subject of an address by President R. W. Campbell, of the National Safety Council, who outlined in broad detail the activities of that body, and the incidence of the work of local councils upon the safety movement in general.

PLANS OF THE COUNCIL.—President Dow spoke on this topic and outlined the need for general safety work. The statistics he presented, showing the number of lives lost in New York, indicated very clearly the need for activities such as the local council is undertaking.

After the addresses President Dow called upon others present for the benefit of their suggestions. Inasmuch as

the executive committee of the National Safety Council had a meeting in New York City earlier in the day, short talks were given by H. W. Forster, of the Independence Inspection Bureau, Philadelphia; H. M. Wilson, United States Bureau of Mines, and Secretary W. H. Cameron, National Safety Council.

It was planned to hold the next meeting in the latter part of May. Various projects are now under consideration by the officials of the local council to make its work and development as effective as possible.

## BALTIMORE COUNCIL NO. 20.

THE FIRST general meeting of the council was on April 22. Dinner was served to sixty representatives of the leading industrial and other concerns of the city. President A. A. Roth acted as chairman.

President R. W. Campbell, of the National Safety Council, the guest of honor and speaker of the evening, gave an address on "The National Safety Movement," closing with an explanation of the aims and possibilities of local councils and of the importance in the work of the National Safety Council.

BRINGING MEN TOGETHER.—The object of the meeting was to bring together the men who, whether for business or personal reasons, are interested in the industrial aspects of "Safety First"; to explain to them the imperative need and the real lasting value of accident prevention work; to show how the safety movement is co-ordinated, organized and vitalized by the National Safety Council; to show how necessary the National Safety Council is to them, and how necessary, likewise, they are to the national and the local council.

Mr. Campbell's address will, it is believed, do much to encourage general safety work in Baltimore and, incidentally, lead to an increase in the membership of the local council.

At a conservative estimate, the concerns represented at the meeting employ 25 per cent of the workmen in Baltimore.

## EXPLOSIVES IN METAL MINES.

The United States Bureau of Mines has issued a primer on explosives for metal miners and quarrymen, by Charles E. Munroe and Clarence Hall. The bulletin says in its introduction: "In accidents resulting from the use of explosives in metal mines and quarries in the United States more than 130 men were killed and 250 seriously injured in 1913. An unknown number of miners suffered from the effects of breathing the harmful fumes and gases given off by the burning or the incomplete explosion of some explosive. Consequently, the Bureau of Mines, which is endeavoring to increase safety in mines and to abolish conditions that tend to impair the health of miners, is studying the kinds of explosives used in mining and the conditions under which these explosives can be used with least danger to the miner.

"Inflammable gas or dust is seldom, if ever, found in quarries or metal mines, and the danger from using explosives there is less than in coal mines; but, as the figures show, the number of men killed and injured yearly in accidents caused by explosives proves the need of both miners and mine officials striving to see that none but proper explosives be used and that these be used properly."

The bulletin contains chapters on combustion and explosion; blasting and mine explosives; fuse, detonators, and electric detonators; firing blasts by electricity; the use of explosives in excavation work; the use of explosives in quarrying; the use of explosives in metal mining and tunneling; drilling and blasting methods on New York rapid-transit tunnel; magazines and thaw houses; permissible explosives, etc.

## SAFETY IN SMALL PLANTS.

The executive committee of the National Safety Council has approved a plan for safety organization in small plants. The council's bulletin entitled "How to Organize for Safety" has been looked upon as applicable more particularly to the larger industries.

## WIREGLASS WINDSHIELD.

In this broken wireglass automobile wind shield the glass is shown broken in every direction, yet it remains intact in the frame. The driver of the automobile said the glass "just broke," but he came in with the rear springs broken on the machines, also. After viewing many broken wind shields and noting several serious accidents to the occupants of cars who were cut with broken glass, V. R. Hughes, safety inspector of the Pacific Gas & Electric Company, San Francisco, suggested to a garage superintendent that he try wireglass. The picture shows the first result obtained.

## NEW IDEA IN EMBOSSING PRESS GUARDING.

Embossing presses present at their best a serious hazard to the operator's hands, and any ideas or devices which may tend to decrease that hazard are always of interest.

The accompanying illustration shows a safeguard designed by O. F. Murray of the inspection department of the London Guarantee & Accident Company, Ltd., as applied on the feed end of a "Sheridan Leather Embossing Press." The guard works automatically, being attached to the traveling head of the press, causing it to drop down in front of the press plates immediately the machine is started, thereby preventing the operator's hands from getting between the plates.

**Embossing Press Guard.**

The guard has been installed for several months in the Griess-Pfleger Tanning Company's plant in Chicago, and the managers have expressed themselves as being enthusiastic respecting the practicability of the guard, saying it is the only practical suggestion for the safeguarding of the feed end of this press that has been submitted to them.

# "THE MAN ON THE JOB"

*COMPETITIVE ARTICLES RELATING TO THE PREVENTION OF INDUSTRIAL ACCIDENTS BY EDUCATION OF WORKMEN, METHODS OF MANAGEMENT AND MECHANICAL SAFEGUARDS*

**No. 164** THE PRACTICAL SAFETY MAN.—Now that thorough safety work has become a necessity in every plant many a young and inexperienced man is called upon to take up the work, and this article is meant to give him some plain advice as to getting the best results.

Organization is the first consideration, for upon it nearly one-half of your success depends. Begin at the top with the superintendent, who ought to be, if he is not, a convinced believer in safety. Show him that it and efficiency are inseparable, and that every step you take will be an aid to efficiency. Having secured his cooperation, ask him to bring the assistant superintendents together for an informal discussion. Assure each one that your object is far from hindering the ordinary routine; rather is it intended as an aid to production. After having secured the help of the assistant superintendents, take the foremen into your confidence; show them that you are anxious to aid them in preventing accidents to their men. Remind them that records are kept, showing which foreman is most successful in keeping his men out of trouble, and that his example is worth following. Then tackle the sub-foremen and the workers, suiting your argument to each class of workers.

In your campaign recollect that the most successful results are obtained by organization and education, and, while you are attending to these features, the insurance and State inspectors will, as a rule, on account of their experience attend efficiently to the erection of safeguards. Your knowledge on this point will depend on a careful analysis of past accidents and whether suitable steps have been taken to prevent a repetition. You are working on sure ground when you argue for a guard at a point where an accident happened that is not yet protected. The foundation of all your work will be an analysis of the accidents that have happened previously and, moreover, you will be of much use in directing the opinion of outside inspectors in recommending guards, for which office they will be duly grateful and your own work will be materially aided by their cooperation.

Be careful to keep forever in your mind the fact that men can be led toward safety; they cannot be driven. Use every endeavor to get the officers on your side and show them that you are anxious for their success in accident prevention, which is a far more cogent plea than attempting to make them enthusiastic for your success in that respect.

In a factory, with about 1,000 men, three or four of the heads of the larger departments ought to be enough to form a plant safety committee, which should meet once a month, consider serious accidents, decide on structural alterations, the publication of rules, the recommendations of insurance and factory inspectors and the minutes of the foremen's safety committee.

The foremen's safety committee, consisting of about eight men, should meet once a week and consider all accidents since the previous meeting, make recommendations to the plant safety committee, take steps to educate the sub-foremen and the workmen and receive reports from them. For each committee there should be an agenda and rules so that

the business could be carried on in a systematic manner. The safety man, of course, acts as secretary to each.

In educating the men it should never be forgotten that the best time to rub home the safety lesson is immediately after an accident has happened, right on the spot and in the presence of the foremen, witnesses and such others as can be approached conveniently. You will not only have good results in this but you will gain first-hand knowledge necessary to understand the cause and to make a complete report.

Do not forget that small money prizes, judiciously distributed, are a great aid to success. It is surprising how much whole-hearted help can come from foremen by this means, but it should not be put in force till your organization is complete.

One of the greatest levers in the campaign is to be able to apportion responsibility, and, with that object in view, hasten to make a blue-print that gives the whole organization of the plant from a safety point of view, showing the assistant superintendents, the foremen and sub-foremen interested in safety the territory they cover and the men under their jurisdiction. With this data in hand the fixing of responsibility may easily be established and statistics can be published at the end of each month, showing exactly how much time is lost in each department due to accident and its relation to the number of days worked.

Do not overlook the value of advertisement. Post signs throughout the factory in conspicuous danger spots and have a good illuminated "Safety First" sign at the main entrance, if there be night workers. Bulletin boards with appropriate information frequently changed and suggestion boxes will help the work a whole lot.

Last, but not least, make a thorough daily inspection of a portion of the plant in company with the head of the department and arrange the plant into districts so that a portion can be inspected each day of the week. As you inspect have your inspection form ready and make notes of any objectionable feature as you go. Hand to the assistant superintendent a copy of your recommendation and keep the original for your file to be transferred when you are informed of its completion.

The intelligent safety man will find out that thorough success of his work depends somewhat on many factors not generally supposed to be within his sphere, but, if he is truly progressive, he will quietly assume a responsibility which will really fit best on his shoulders and be a considerable aid in the work. In other words, he will broaden his activities; he will look after the sanitary arrangements, the lighting, the cleanliness of the floors and the general health of the employes; he will discover that workmen have souls. He will advocate, if such has not already been done, the physical examination of the workers, with the object of having them always in as good a physical condition as possible. Finally, he will seek to control the employment of labor, or at least veto the taking on of undesirable citizens.

* * *

No. 165 INTEREST THE WORKMEN.—The principles to be applied and a few slogans toward the prevention of industrial accidents:

First.—Instil in the plant the spirit of carefulness.

Second.—Perfect an organization to carry it out.

Third.—Provide the best safeguards.

Of the perils to workmen the world has ample knowledge, but it appears that it remedies only on the heels of disaster and safeguards only after sacrifice. Better an ounce of "did" than a pound of "going to do."

More attention has been paid of late to the use of safeguards for the prevention of accidents to operators of machines and equipment than in former years. Yet, with all the safeguards provided, we often find they are not filling the bill, and no doubt in a great many cases the guards are not used. Why is their use neglected, and how can their use be assured? That is the great question at this time.

In the first place the guards should be of such a nature as to adequately guard against danger, even if the operator's mind is not on the work before him. To

get this kind of a guard the employer should co-operate with the employe and solicit suggestions and give the suggestions due consideration, as they may be good. Guards suggested by employes will in nine cases out of ten be used at all times. Co-operation will also get the employes interested in accident prevention work.

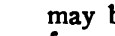
Personal caution is the greatest of all means of preventing accidents. Hands off sometimes means fingers on.

Often, when everything goes well, the use of safeguards is neglected and not revived until some serious accident occurs.

Weak men believe in luck and circumstances; strong men believe in cause and effect.

Accidents to yourself and others are usually someone's fault; don't let them be your fault.

Progress is the shortest way between two points. Safety points the way and guides away from danger.



**No. 166** RESPONSIBILITIES OF HEADS OF DEPARTMENTS.—Never in the history of the world's industry has the gospel of the employer and the employe been preached with a greater show of reason than in the matter of safeguarding man's existence and the wellbeing of his body. When we fail to use all of our influence in shaping the thought habit of those under our direction to the highest conception of human conservation we fail in the fulfillment of the greatest trust given to our keeping.

The position of operating superintendent carries with it no less responsibility, and he should be no less ardent in effort than the most erudite safety engineer in establishing a fixed thought throughout his organization to prevent injury to workmen. It may be said truthfully that under all intelligent management the duty of the man in executive position to disseminate safety teachings increases directly with his authority, and that his attitude toward reducing the hazard of occupation is vividly reflected in the attitude of his subordinates. A disregard for adequate precaution against injury by unskilled workmen may be termed ignorance or carelessness, but on the part of foreman or superintendent only the ugly term "criminal negligence" appears to fit.

One of the most efficient methods of eclipsing danger by safety is for the department head to make "watchfulness" the basis of his acquaintance with the men who serve under him, and the "man on the job," who goes out among his fellows and demonstrates that nothing is too small for his consideration when its neglect may prove a physical detriment to another, may well be regarded an efficient protector of life and industry. When the boss honestly faces the obligation of his stewardship his vision will clear; for he may eliminate the loss of the employer and the suffering of the employe from his consideration, and there still remains the vast multitude of women and children who form the background in the painting of the wage-earner.

The means through which safeguards may be established and the safety habit formed are many and various. One of the most unique and effective that has come to notice is that of having each employe in a department cite an instance in which an injury has been narrowly averted. This frequently reveals a condition or practice that has escaped both operating and safety observation.

The preservation of life and energy to ultimate purpose appeals to every strata of business, and, if kept constantly in mind by the man who is alive to the responsibility of his time and place, will bear fruit for his chosen work and for humanity.

The department head and his assistants are placed upon pedestals, and what they may do or may not do in the matter of safety is so far reaching that generations yet to come must bear the burden or reap the reward.

**No. 167** SAFETY FIRST IN BUSINESS.—The great "Safety First" movement, which has swept over the country in the past few years, has progressed astonishingly, with pleasing results, due, in part, to the co-operation of the large plants.

However, as the greater concerns become enthusiastic, the small producers, as a general rule, sulk in their corners, bristling at any suggestion of introducing safety appliances and absolutely refusing to invest money in safeguards from which they see no return. These small industries represent a class which will keep the "Safety First" committees on edge, and, unless a clever method is devised for bringing them over to the right side, we will continue to pitch our nickels to the one-legged men who wait on the corners.

The compensation laws, which so many of our States have in force, help this matter to a certain extent. The necessary payment of remuneration to injured employes and the laws to require certain dangerous features to be guarded in all factories have been great steps toward the universal safety for which we strive. But if the employer is not in svmpathy with the movement, and just keeps ahead of the law, the spirit in his shop will not be improved to any great extent, and the artificial limb business will prosper and thrive, even though severed hands, fingers, etc., have values of a few thousand dollars in the law courts, the criminal himself dodging behind the protection of the casualty company which offers him the cheapest rate.

There is, however, an argument for safety which should appeal to any man who has good business sense. The manufacturer owes his success to three things: the efficiency of his equipment; the skill and permanency of his labor, and the degree of perfection of his working system. The equipment, perhaps, receives the greatest attention, because upon that depends the day's production, and every hour that a machine lies idle takes money from the owner's pocket. Upon discovering a broken part, a gang of workmen is rushed immediately to the spot to repair the damage in order that the output may not fall below standard.

Let us consider the man who operates the machine. Is not his skill almost as essential to production as the machine with which he works? Allow him to become injured, and his place is empty. It may be days, weeks or months before he returns to his duties, and in the meantime some portion of the plant is in need of an experienced man. It requires time for even a good mechanic to become accustomed to a new position or the tricks of a strange machine, and the output is consequently decreased, while the running expense remains the same. This may happen in a busy season, and the small employer can be very much annoyed by losing the services of a workman. But while he is provoked at his "tough luck," the financial side of the question does not appear to him, and consequently the same thing is permitted to happen repeatedly.

What would happen if the "Safety First" movement were presented to the unbeliever as a money-saver as well as a humane effort to benefit society? Care for the working man and accident prevention would be introduced into even the smallest workshops and the direct lucrative bearing which this item has on the profits of the business would cause the employer to enforce safe practices, with a strict vigor and a watchful eye.

There is an old saying that "money talks," and here is the place where you can corner your man and let his own money talk to him. He may not say "Safety first, for my employes' welfare," but he will write it on his checkbook lest he forget that "Safety First" means a profitable business.



**No. 168** TEACHING THE WORKMEN HOW TO AVOID ACCIDENTS; OR, THE STORY OF ACCIDENT PICTURES.—As a member of the safety organization of a large steel plant I was called into the office of the boss and asked what I could suggest to further the cause of safety in the plant. I suggested that pictures, which would tell the story of an accident, be taken and placed on the safety bulletin boards and printed in the monthly safety bulletin. The boss at once thought it was a good idea and told me to get up a few sets. These were submitted and the photographer and I went into the mill to get the pictures. When necessary we arranged conditions and got the workmen to pose for us in a manner to bring out the lesson we wished to teach.

# Winning Writers Competitive Articles

## "The Man on the Job"

### Denver, Col.

FRANK H. TREGO, Sales Manager, Stonehouse Enameled Steel Sign Company, Honorable Mention, June, 1914. First Prize, December, 1914.

### Hartford, Conn.

JOHN WRIGHT, Superintendent, Bureau of Inspection and Accident Prevention, Aetna Life Insurance Company. First Prize, June, 1914.

### Stamford, Conn.

EDGAR M. ATKIN, Manager, Service Bureau, Yale & Towne Manufacturing Company. Second Prize, June, 1913.

### Atlanta, Ga.

A. J. MURPHY, Inspector, United States Casualty Company. Second Prize, September, 1914.

### Chicago, Ill.

RICHARD HOAG, Creamery Package Manufacturing Company. First Prize, March, 1915.

HENRY N. MILLER, Inspector, Aetna Life Insurance Company. First Prize, August, 1914.

JOHN H. RECH, Clerk, Crane Company. First Prize, November, 1914.

CHARLES B. SCOTT, Manager, Bureau of Safety, Middle West Utilities Company. First Prize, January, 1914. Second Prize, October, 1914.

HERMAN J. H. WOEHLCK, Medical Department, Crane Company. First Prize, October, 1913.

### East St. Louis, Ill.

STANLEY H. KERSHAW, Safety Department, American Steel Foundries. Second Prize, April, 1914.

### Joliet, Ill.

JOHN G. BRENNAN, Foreman, Billet Yard, Illinois Steel Company. Second Prize, March, 1915.

### Peoria, Ill.

L. A. PHELPS, Superintendent of Factory Inspection, Avery Company. First Prize, May, 1914.

### Pullman, Ill.

C. P. BAYNE, Chief Clerk, Department of Safety, The Pullman Company. First Prize, April, 1914.

### South Chicago, Ill.

C. M. BRADING, Superintendent of Safety, Wisconsin Steel Company. First Prize, June, 1913.

ROY E. SMITH, Safety Inspector, Illinois Steel Company. Honorable Mention, March, 1914.

### Springfield, Ill.

D. KRANICHFELD, Safety Engineering Department, National Association of Manufacturers, Racine-Sattley Company. Second Prize, October, 1913. First Prize, September, 1914.

### Buffington, Ind.

R. E. Smith, Safety Inspector, Universal Portland Cement Company. First Prize, January, 1915.

### Indiana Harbor, Ind.

CHARLES E. SLYKE, Superintendent, Bolt and Rivet Department, Inland Steel Company. Second Prize, August, 1914.

J. C. SMITH, Safety Department, Inland Steel Company. Honorable Mention, September, 1913.

### Indianapolis, Ind.

DANA WEBSTER, Safety Inspector, Aetna Life Insurance Company, Traction Terminal Building. Honorable Mention, December, 1913.

### Mishawaka, Ind.

E. H. AHARA, M. E., Superintendent, Dodge Manufacturing Company. Second Prize, December, 1913.

M. W. MIX, President, Dodge Manufacturing Company. Honorable Mention, September, 1913.

### Cedar Falls, Iowa.

JOHN HARNER, Superintendent, Iowa Gate Company. Honorable Mention, December, 1913.

### Baltimore, Md.

W. R. HAMBURY, Inspector, Casualty Department, Fidelity & Deposit Company of Maryland. Honorable Mention, January, 1915.

### Boston, Mass.

FRANK J. FENTON, Liability Inspector, Globe Indemnity Company, New England Territory. Honorable Mention, January, 1914.

ALFRED H. TALPEY, Inspector, Accident Prevention Department, Massachusetts Employees Insurance Association. First Prize, March, 1914.

### Detroit, Mich.

C. H. LIEBFRIED, Safety Engineer, Inspection Department, London Guarantee & Accident Company, Limited. First Prize, October, 1914.

HENRY N. MILLER, Inspection Department, Aetna Life Insurance Company. Second Prize, September, 1913. Second Prize, December, 1913. Second Prize, February, 1915.

## North Springfield, Mo.

B. M. Moseley, Machinist, Frisco Railroad Shops. Second Prize, August, 1913. Second Prize, January, 1914.

## Anaconda, Mont.

W. C. Capron, Assistant Chief Engineer, Anaconda Copper Mining Company. Honorable Mention, July, 1914.

## Gloucester, N. J.

W. B. Grover, Draughtsman and Factory Inspector, Welsbach Company. Honorable Mention, November, 1913.

## Passaic, N. J.

Joseph Spitz, Inspector, New Jersey State Department of Labor. Honorable Mention, August, 1913.

## Buffalo, N. Y.

F. M. Harp, Safety Engineer, L. A. Wight & Co., General Managers, Employers' Mutual Insurance Company. Second Prize, January, 1915.

J. F. Kopf, Safety Inspector, Aetna Life Insurance Company. First Prize, August, 1913. First Prize, April, 1914.

## New York, N. Y.

David M. Allan, Inspector, Aetna Life Insurance Company. Second Prize, July, 1914.

R. J. Bell, Jr., Inspection Department, Aetna Life Insurance Company. Honorable Mention, August, 1913.

Ed P. Elzy, Bureau of Inspection and Accident Prevention, Aetna Life Insurance Company. First Prize, December, 1913.

J. D. Hackett. Honorable Mention, August, 1914. Honorable Mention, March, 1915.

J. C. Robinson, Chief, Bureau of Adjustment, New York Edison Company. Second Prize, March, 1914.

John E. Saunders, Inspector, United States Casualty Company. Honorable Mention, April, 1914.

Walter I. Sweet, Safety Inspector, General Accident, Fire & Life Assurance Corporation, Limited. Honorable Mention, February, 1915.

## Rochester, N. Y.

Allen F. Hackett, Employment Supervisor and Secretary, Safety First Committee, Rochester Button Company. Honorable Mention, February, 1915.

D. Charles Ryan, Eastman Kodak Company. Honorable Mention, May, 1914.

## High Point, N. C.

Thornwell Haynes, Advertising Writer. Honorable Mention, September, 1914.

## Cleveland, Ohio.

Stephen W. Tener, Manager, Accident and Pension Department, American Steel & Wire Company. Second Prize, September, 1913.

## Toledo, Ohio.

Robert McKinley, Local Inspector, General Accident Insurance Company. Honorable Mention, February, 1914.

## Youngstown, Ohio.

Walter Greenwood, Safety Engineer, Ohio Works, Carnegie Steel Company. Honorable Mention, October, 1914.

Dudley R. Kennedy, Special Agent, Accident Department, Youngstown Sheet & Tube Company. Honorable Mention, July, 1914.

James M. Woltz, Safety Director, Safety Department, Youngstown Sheet & Tube Company. Second Prize, November, 1913.

## New Kensington, Pa.

Robert H. Fulton, Jr., United States Aluminum Company. Second Prize, February, 1915.

## Pencoyd, Pa.

H. G. Knoelke, Chairman, Safety Committee, American Bridge Company. Second Prize, May, 1914. Second Prize, November, 1914.

## Philadelphia, Pa.

Albert C. Baker, Safety Engineer. Second Prize, February, 1914.

Francis D. Patterson, Director, Department of Sanitation and Accident Prevention, Harrison Brothers & Company. Honorable Mention, June, 1913.

R. W. Robinson, Inspector, Ocean Accident & Guarantee Corporation, Limited. First Prize, July, 1914. Second Prize, February, 1915.

## Scranton, Pa.

B. H. Remaly, Inspector, Globe Indemnity Company. Honorable Mention, July, 1914.

## Providence, R. I.

Luther D. Burlingame, Chief Draftsman, Brown & Sharpe Manufacturing Company. First Prize, September, 1913.

John T. Walsh, Brown & Sharpe Manufacturing Company. Honorable Mention, August, 1914.

## Denison, Tex.

W. H. Aldrich, Superintendent, Inspection Department, Southwestern Surety Insurance Company. Second Prize, December, 1914. First Prize, February, 1915.

J. A. MacKinnon, Chief Inspector, Inspection Department, Southwestern Surety Insurance Company. First Prize, November, 1913.

## Milwaukee, Wis.

H. L. Coutzon, Secretary, Safety Committee, A. J. Lindemann & Hoverson Company. Honorable Mention, October, 1913.

J. Seton Gray, Assistant Master Mechanic, Milwaukee Coke & Gas Company. First Prize, February, 1914.

G. M. Mackie, Master Mechanic, Milwaukee Coke & Gas Company. Honorable Mention, December, 1914.

## Toronto, Ont., Canada.

Riley Schenck, Manager, Canadian Safety Engineering Bureau. Second Prize, June, 1914. Honorable Mention, November, 1914.

The first story of an accident consisted of four pictures. The first showed a chipper being placed on the job by the foreman. The foreman had in one hand a pair of goggles which he was holding out to the man and the workman had one hand extended to receive them. With the other hand the foreman was pointing to a sign, which stated in English and several foreign languages the rule in regard to the wearing of goggles when chipping or doing any work where there was danger of eye injury.

The second picture showed the man chipping a casting with the goggles stuck up on his hat. The third picture showed the man kneeling beside the casting, with a hand over an eye. The fourth picture showed the man on the steps of the hospital, with a bandage over the eye. He had lost the sight of the eye.

Appropriate wording was placed underneath each picture and below all was a moral in regard to the wearing of goggles.

The pictures and others from the same source have been circulated all over this country, and I have been informed that, in many plants where it was hard to enforce the rule in regard to wearing goggles, after the men had seen the picture the workmen willingly wore the goggles.

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**No. 169** THE EMPLOYER'S DUTY TO THE EMPLOYE. — Inspection and safeguarding are too often neglected essentials of safety work. If parents desire the child to have high ideals of life and right living, they must set a good example before the child and direct its mind to a real and existing high standard.

Too many employers adopt "Safety First" as a slogan, direct a superintendent or claim agent to inform the employes of the move and then dismiss the thought from their own minds, expecting the mite of leaven to leaven the whole organization and thereby eliminate accidents from their plants.

Sincerity must characterize any movement designed by the management and solicitous for the co-operation of the workmen; not assumed sincerity, but real, earnest sincerity. The workmen are not easily deceived by the order that is not backed and supported by the employer.

"Safety First" campaigns, consisting of signs, buttons, lanterns, cigars and refreshments, with a conspicuous absence of mechanical safeguards, safe working conditions and alert inspections, are "piffle," and the first to recognize this fact is the "man on the job," who to himself says "The company doesn't mean it."

If an employer started a movement for the output of an improved product, he would first of all provide a high grade of raw material and improved machinery and otherwise do his part in the preparation for the expected change and after that he would ask his workmen to co-operate with him. Safety of operation is no less a common sense proposition, and no less does it deserve business-like attention from the employer.

Inspect the plant, remedy glaring defects, provide safe tools and appliances and then ask the "man on the job" to join you in an effort to conserve the life and limb of your workmen. This is common sense; this shows sincerity, and this will bring results in which you have had a part becoming the dignity of the position of employer. Too many employers do not know the physical conditions of their plants, and a personal review of such conditions is entirely too infrequent.

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**No. 170** THE GENERAL APPLICATION OF SAFETY DEVICES.—Granted that the installation of safety devices is warranted, both from a desire to prevent serious accidents and in order to comply with the requirements of existing laws, it remains to select the appropriate device and apply it so that the result will be a permanent and reasonably inexpensive cure for the dangerous conditions that existed.

While it is now conceded generally that only 10 per cent to 20 per cent of the general run of accidents can be prevented by safeguards, the remainder being mainly the direct result of careless-

ness or ignorance, and therefore avoidable only through the inculcation of the "safety habit" and the attainment of wider knowledge and better discipline, the provision of safe working conditions is an important part of the engineer's and the superintendent's duties, which each owes to his company and to the employes. For this reason the application of safety devices, which is sometimes looked upon as a "detail" or a "refinement," deserves the careful thought and study of every engineer, inspector and mechanic.

In addition to this, if the study of injury prevention is given the benefit of the attention that it deserves, it will be found as interesting to the men engaged in it as other branches of engineering work, which, though perhaps broader and older, can have no motive higher than the conservation of human life.

The proper compensation for the loss of a limb is still a matter of contention. The value of a life has never been set, but the cost of a safety device—a "detail"—which might have prevented such an accident is a matter of a few dollars and cents.

"For the want of a nail, a shoe was lost;

"For the want of a shoe, a horse was lost;

"For the want of a horse, a rider was lost;

"For the want of a rider, a battle was lost;

"For the want of a battle, a kingdom was lost;

"And all for the want of a horseshoe nail."

As regards the choice of safety measures, the elimination of dangerous conditions is naturally the best course and should receive the first consideration. It is far better to cut off the useless projecting end of a line shaft than to guard it, and oftentimes a little study, applied to the regular route of an oiler through dangerous machinery, will reveal the possibility of his adopting a safer course of travel.

The rule should be: Where possible, eliminate the risk; where impossible, apply safety devices.

If these latter are out of the question, as they seldom are, a warning sign is the best substitute, but it should be remembered that at best this is only a half-way measure. Signs presuppose that the employe can read and, moreover, will read every time he passes that way. To be at all effective, it must be in as many languages as there are nationalities represented. Men have been killed above a sign of "Stop Machinery Before Oiling" and have lost their arms in the face of a notice reading, "Keep Hands Off While Machine Is in Motion." In a word, signs cannot be trusted to do the work; and, if the warnings contained in them must be disregarded under emergency or repair conditions, they are all the more likely to be habitually unnoticed. Printed rules and oral instructions are also unreliable; obedience to them must be continually enforced or they will be forgotten or disregarded by the employe who "thinks he knows better." Moreover, the new man is prone to suffer through ignorance of them. Safety devices are better and elimination is best.

When beginning to determine what kind of guards to apply or whether the condition needs a guard, do not look at the situation solely from your own point of view, but from that of an ignorant, careless or hurried employe. All employes are not ignorant, careless or hurried, but in any company there are many ignorant and careless men—the ones that are the most likely victims.

Remember that we all consider ourselves well-balanced mentally—until an accident happens, when we remark, "What a fool I was!" We are inclined to take risks and "short cuts." Therefore apply guards where there can be any reasonable doubt and apply them for the protection of the ignorant, the careless, the hurried, the indifferent, the preoccupied, the unskillful and the man with loose and ragged clothing or the dangling bunch of waste. These are the men whose names appear on the injury reports. The wide-awake men, alert and "on the jump," can take care of themselves unless defective machinery or other men get them into trouble. A "foolproof" safety device does not exist. Make yours as foolproof as practicable; there will be enough fools to test it.

Make your safety devices thorough; see that they guard every part. There is danger in the slow-moving gear, even the gear on the hand-operated winch, and death in the smooth, bright shaft around which a thread of waste can take hold with a grip strong enough to pull in a jumper and finally strong enough to pull in the whole body.

A shaft-end appears harmless, but it can twist up a loose sweater as the end of a lead pencil twists a cotton handkerchief. Six feet is not a long distance to fall, but if a man falls head foremost it may be fatal, while if he is forced to jump such a distance suddenly, which would be nothing if he were prepared, he may sprain an ankle or break a leg. It is easy to let go of a stick or the handle of a wheelbarrow and only the act of a moment, but a stick used to apply belt-dressing can be drawn in between belt and pulley before the hold can be released, and a heavily loaded wheelbarrow, unbalancing from a single plank runway only a few feet above the ground, will pull a man off with it and, in six cases out of ten, land with its contents on top of him.

Make your safety devices substantial, so that they will stand up under ordinary wear and tear; so that they will stand constant removal for repair, and so that they will look like an essential part of the equipment and will go back after they have been removed. There is no economy in flimsy construction and no pride can be taken in a poor job, especially one that is designed to protect life and limb. Put a "factor of safety" into your safety work, where it belongs as much as it belongs in any engineering enterprise. Do the work right in the first place and it will cost less in the end and in the meantime will be worthy of a "safety engineer."

## PRIZES FOR APRIL ARTICLES.

*First Prize. No.* 160. *W. H. Aldrich, Superintendent of Inspections, Southwestern Surety Insurance Company, Denison, Texas.*

*Second Prize. No.* 163. *S. W. Parker, Treasurer, The Dressel Railway Lamp Works, New York, N. Y.*

*Honorable Mention. No.* 162. *J. C. Robinson, Chief, Bureau of Adjustment, The New York Edison Company, New York, N. Y.*

*A meritorious article was contributed by Walter I. Sweet, Safety Inspector, General Accident, Fire & Life Assurance Corporation, Limited, New York, N. Y.*

## COMMENTS BY MEMBERS OF THE COMMITTEE.

I have carefully studied all of the points in article No. 160, and I cast my vote for this number for first prize. It is interesting from beginning to end, touching on experiences with "Safety First" in its infancy, and pointing out some of the difficulties met by safety inspectors, superintendents and foremen. Several valuable suggestions are given in reference to overcoming these difficulties, two of which I outline:

"The dividing of the plant into safety divisions, each under the leadership of some capable foreman who is specially fitted for the work. In places where this has been done accidents have decreased from 40 to 50 per cent."

"Posting of attractive signs at the most conspicuous places, keeping them well painted and fresh, and even changing their position and design at times to attract attention."

There are other valuable hints in this article, some of which might well be heeded by the employer as well as his employes, as the reader will observe in studying the writer's review of the advancement and hindrances of the "Safety First" movement. There is no doubt that the writer has had considerable experience along these lines, and through his energy and alertness he has been a minute man in his locality, and we trust we will hear from him again.

In my opinion, No. 160 is the best article. The subject of accident prevention from all standpoints is discussed ably and the safety inspector receives the credit due him for his part in the safety movement. Today the safety inspector is one of the most vital forces in this movement and, with the co-operation of the management and the workmen, is accomplishing wonders in the prevention of accidents. No. 162 should be given second prize. It is a very excellent article, and has several good points. The point in regard to education is very good.

No. 162 is my choice. The writer covers the importance of co-operation, individuality, perseverance in overcoming the skeptical attitude of the employe and his implicit confidence in the foreman, wherein so much lies in accident prevention; and his knowledge of the unreliability of safeguards in reducing accidents give to him my vote. My second choice is No. 160.

A consideration of the safety engineer's work is certainly worthy of attention, and the author of article No. 160 has well described some of the work, besides offering some very satisfactory suggestions for the prevention of accidents.

I am forced to the conclusion that the writer of article No. 160 ought to receive first prize. His article indicates that he has had vast experience as a safety engineer and that he has given the matter considerable thought. I agree with the writer that any means should be resorted to in an effort to cause an employe to stop and think before he acts. When an employe stops and thinks before he acts he becomes of greater value to his employer and his fellow employes.

No. 160 gets my vote because I agree with him that the man who thinks is the man we want on the job.

No. 163 receives my vote for the first prize. The suggestions in this article as to the requirements necessary in order to become a successful "Man on the Job" are right to the point. The safety problem will not be solved by men who stand still, but by men who are constantly on the alert, devising ways and means to eliminate all hazardous conditions.

I cast my vote for No. 162. We can eliminate a large percentage of accidents by properly educating the people; possibly a larger percentage than by application of mechanical safeguards.

I wish to cast my vote for No. 160, as I am of the opinion that it is the best article.

No. 160 is my choice. The writer has outlined a number of very good new suggestions on how to meet with success in the general inspection of a factory.

## CONDITIONS OF COMPETITION.

*SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The prizes are awarded for articles describing or explaining Practices, Methods of Management or Operation, Regulations, Systems, Recommendations, Suggestions, Ideas, Safeguards, Safety Devices, or Apparatus. The Committee of Award will be influenced, in each case, by the evidence which the article gives of its writer's knowledge of and interest in accident prevention in general, as well as by the practicability and range of the concrete suggestions made and, in cases where these suggestions are peculiar to some particular industry, the understanding shown of the hazards of that industry.*

*The merits of all articles will be passed upon by a Committee composed of Safety Engineers, Managers, Superintendents of Plants and Workmen.*

*Drawings, sketches and photographs are invited whenever they will aid or supplement the descriptions in articles.*

*Contributors are requested to be as concise as possible. Articles should not exceed the limit of 800 words. The competition is open to everybody competent to write on the subject without the requirement of a consideration of any kind for the privilege of competing.*

*Blanks upon which to submit articles will be furnished on application, but any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

His ideas of safety engineering bring the employer and employe in closer touch with each other. Such an outline, followed up, will mean more success to "Safety First" in almost every plant, if just a little tact is used.

I believe No. 160 to be entitled to first consideration, with No. 162 a close second. I have selected No. 160 for the reason that the arguments set forth in this article have been to a large extent my own experiences in this field.

To my mind No. 162 gets closer to the ground and has the strong story of the month. It is most desirable that the employe should keep in mind his own and his fellow's safety. All other efforts toward safety—rules, signs, inspectors, insurance, safeguards, and all—fail of their best effects if the workman himself is not alive to the full meaning of "Safety First."

My vote is cast for No. 162. Two statements contained in the article I do not entirely agree with. Though it is commonly accepted as true that 30 per cent is the proportion of decrease in accidents obtained by mechanical protection, we have no authentic knowledge as to how or when this estimate originated. If a period was taken when no safeguarding whatever existed for comparison with a period when nearly perfect safeguarding existed then the statement is justified. Since no period can be taken when there was an entire absence of mechanical safeguarding, we cannot determine the ratio the accidents occurring under these different conditions bear to each other. I am very much inclined to think mechanical safeguarding results in reducing accidents, at least serious ones, more than 30 per cent. My statement is not made to affect the arguments in No. 162 but to dispute what has been commonly accepted as a fact. Second, without desire to belittle the argument, I hesitate to believe "The average man is prone to show less alertness of mind and activity of body as he feels that he is being mechanically protected from danger." One of the arguments put forth to sustain my contention is that the sight of safeguard appliances serves in a higher degree to emphasize the importance of avoiding danger than all other devices intended for centering one's attention on the idea of being careful.

## RAILROAD WAS POWERLESS.

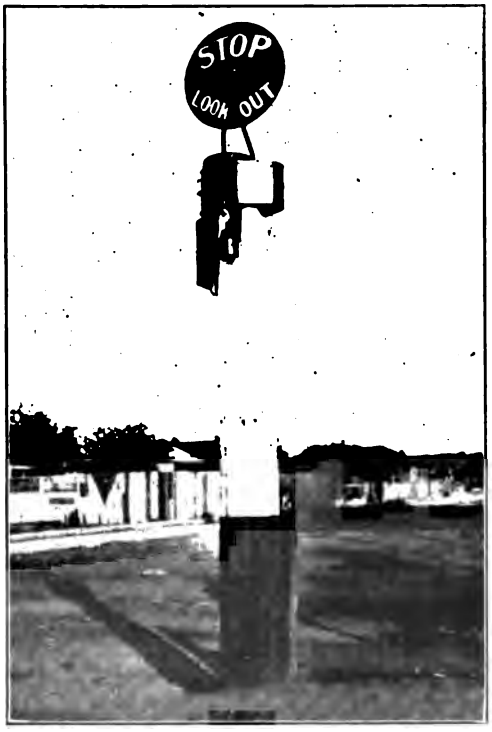
If every one of the million trains operated on the Pennsylvania Railroad System in 1914 had arrived and departed on time, each one moving over its own particular route without a semblance of a train accident, 19 persons, classed in the Interstate Commerce Commission's accident reports as passengers, would have been killed; but not a passenger was killed in a train accident on the 26,198 miles of track. How the 19 persons lost their lives: Six by falling, jumping or slipping from moving cars or trains; two by attempting to get on moving trains; two by slipping off station platforms in front of trains; two by standing too close to edges of station platforms and being struck by trains; one by jumping off ferry boat; one by throwing himself between cars of moving train; three by crossing tracks at stations in front of trains; one when struck by coach and thrown under train; one when assaulted by another passenger and thrown from train. The railroad was powerless to prevent the fatalities.

## EMERY IN HIS EYE.

A sander in the employ of the Northern Furniture Company, Sheboygan, Wis., while grinding a small tool, received a fragment of emery in his right eye. He did not think it worth while to put on the goggles, hanging on a nail beside the emery wheel. It was one chance in a thousand that nothing would happen, and the man took it. The doctor removed the piece of emery and the workman returned to work the same day. The wheel is well guarded.

## WARNING DEVICE FOR CROSSINGS.

An ingenious danger signal is in operation on the lines of the Pacific Electric Company of Los Angeles. On these lines the interurban cars attain great speed after leaving the city streets, and




**Electric Signal**

accidents were frequent until the signal was installed. It has proved itself to be a life saver and has diminished the number of accidents.

The signal is automatic. It waves a red flag and at night flashes a red light while a bell rings constantly as a car approaches and passes. It also illuminates the crossing.

## AUTOMATIC REVERSER FOR TROLLEY.

A system for reversing a trolley automatically is in use in the main station of the Pacific Electric Railway in Los Angeles. Copper sheathed grooves are arranged overhead in the shape of a Y. When a car enters the trolley is swung around by reversing the car until the

**Trolley Reverser.**

pole meets the junction of the two branches of the Y, where it is turned by the motion of the car running forward which brings it to the main line in the opposite position.

As it is a busy station, accommodating all of the great interurban systems radiating from Los Angeles, the reverse is a time saver as well as life saver, because conductors otherwise would be obliged to stand on the tracks, often in front of moving cars.

## TRESPASSING ON TRACKS.

Statistics compiled by the New York, New Haven & Hartford Railroad Company on the loss of life through trespassing on railroad tracks in the United States show 5,558 fatalities for 1913. From 1901 to 1910 50,025 persons were killed in the United States through trespassing on railroad tracks; 53,427 were injured, some of whom were maimed for life. In the past three years 442 persons were killed and 394 were injured while trespassing on the property of the New York, New Haven & Hartford.

# "THE FIGHT AGAINST FIRE"

*COMPETITIVE ARTICLES RELATING TO THE CONSERVATION OF LIFE AND PROPERTY BY FIRE PREVENTION AND DEFINING FAULTS OF CONSTRUCTION AND HAZARDS OF PROCESSES*

**No. 54** EXTINGUISHING FIRES WITH SAWDUST.—At first thought it might appear absurd to attempt to extinguish a fire by sprinkling sawdust upon it. "Adding fuel to the flames" is a time honored figure of speech, but it is doubtful if it has ever been used to signify the checking or quenching of a disturbance of any kind. As a matter of fact, sawdust is quite efficacious under certain conditions, if properly applied; and it is particularly well adapted for extinguishing small fires in oils and other inflammable liquids. It is well known that fire can not continue in the absence of oxygen, and nearly every one at some time or other has smothered a small fire by covering it with a heavy cloth or some similar object, thus excluding the air.

Anyone who has seen a fire in a pile of sawdust has doubtless observed that, after the outer surface of the pile has burned, the remainder merely smoldered and seldom showed a flame. The behavior is due to the fact that the sawdust particles pack together too closely to allow air to penetrate the surface of the pile freely enough to support the combustion actively.

It is this characteristic feature of sawdust that gives it its value as an extinguishing agent, as it smothers the flame by excluding the air, in very much the same manner as a blanket thrown over the flame, causes the air to be excluded and the fire to go out.

Sawdust may be used successfully for extinguishing burning gasoline that has been spilled on the floors or on the ground; but it is of comparatively little value in the treatment of gasoline fires in large tanks, because it is almost impossible to spread the sawdust over the entire surface before some of it sinks to the bottom, exposing the surfaces at these points and allowing the liquid to re-ignite.

It is far more useful in connection with liquids, such as heavy oils, lacquer, Japan and melted wax, because it floats upon the surface of liquids of this type, and blankets them quite effectively.

The value of sawdust as an extinguishing agent can be considerably increased by the addition of a certain portion of bicarbonate of soda (familiarly known as baking powder), and this substance when exposed to heat gives off carbon dioxide gas, which materially assists in preventing the access of air.

A mixture of ten pounds of bicarbonate to one bushel of sawdust has been found to be satisfactory, and tests that have been made show that, by the use of this mixture, fires may be extinguished more quickly and with a smaller amount of material than when sawdust is used alone.

The character of sawdust appears to have little effect upon its fire extinguishing properties. Wet and dry sawdust, from hard and soft wood, have been tried with equally effective results.

The sawdust should not be too fine and it should be applied as quickly as possible, so as to cover the entire surface of the liquid.

The application may be made most effectively by the use of a broad, flat shovel, similar to a snow shovel, which would hold plenty of sawdust and allow the user to cover a large area with one sweep.

As a precaution against fire in saw mills and other plants where dry sawdust collects in considerable quantities, it may sometimes be advisable to sprinkle sodium bicarbonate upon the sawdust piles at intervals. Should a pile so treated become ignited through some unknown reason the bicarbonate would be of material assistance in checking the combustion.

Other substances may be more effective than sawdust for smothering flames, but few things could excel it in cheapness or in ease of application, and my view is that sawdust should be considered as an effective agent in extinguishing fires when properly used.

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**No. 55** FIRE HAZARDS IN HOTELS.—Little thought was given, until a few years ago, to fire prevention or fire protection in hotels. The main thought then was to deaden the noise, and that was done by arranging the walls in such a manner that it left a flue between the walls, in many cases extending from cellar to roof. The class of construction was the cause of the complete loss of one hotel and the sacrifice of many lives. In such a structure what would be liable to occur, should a fire start in the cellar? It would travel upward through the flue and mushroom out on any floor where it could find an opening, or it might travel up to the attic, and, if it did, what fine fuel it would find there, as then the attic was the storage place for all old furniture and rubbish. The whole thought then was for fancy decorations, dormer windows, cupolas, etc., and the whole was constructed of flimsy material.

Today we are more enlightened on this subject, and what were considered beautiful and attractive in days gone by we would consider very dangerous today. We now have modern, fireproof hotels, beautiful, yet safe. Still there are some hazards. If the owners of the old style hotels as well as the owners of the modern hotels will try to eliminate as much as possible the hazardous conditions, guests will feel safe and satisfied, the firemen will be assisted, the annual fire loss will decrease, the insurance rates will be reduced and the owners will be benefited financially and otherwise.

Of course, the construction of hotels should be entirely fireproof, including flooring, trim and all window casings and sashes, and all windows leading to shafts or courts should be glazed with wire-glass of good quality. Each room or suite of rooms should be constructed as a unit, so that, if a fire should occur in one of the rooms, it would be confined there and could not spread.

Stairways should be enclosed in a fireproof shaft, except the "grand staircase," which could run for one story, but above that all stairways should be enclosed.

The vertical shafts form the principal fire hazards in hotels, there being so many, such as elevator, vent, dumbwaiter shafts, etc. All of the shafts should be constructed of brick, tile or other fire-resistive material; should be kept clean and all openings protected by self-closing, fireproof doors.

The kitchen and the laundry should, if possible, be in a separate building, or they should be separated from the rest of the building by fireproof walls and all openings be protected by self-closing, fireproof doors. The ranges should be installed on a brick or concrete base and woodwork or other combustible material should not be permitted. Care should be used when boiling fat, and the kitchen and the laundry should be kept absolutely clean. The drying room should be constructed of fire-resistive material, and where gas or electric irons are used care should be taken by the operator in the use of them.

The engine room and the work shops should, if possible, be in a separate structure or separated from the rest of the building by fireproof walls. As a large hotel requires quite an army of mechanics and workmen, it therefore requires shops and workrooms, although fire hazards exist in them. Large quantities of paints, oils and excelsior and smaller quantities of volatile and inflammable oils are used. Great care should be used in the storage and handling of the materials. Gasoline and benzine should be kept in approved safety cans outside of building; if handled in large quantities it should be kept in storage tanks underground.

All rubbish, sweepings, excelsior, etc.,

should be kept in metal-lined bins, equipped with self-closing covers or doors.

The best form of fire escapes for this class of building construction is the tower fire escape, with an entrance from each story.

In the matter of fire appliances, an approved system of automatic sprinklers should be installed throughout the building, in every room, cellar, hall, all concealed spaces, and also in the workshop, to be supplied by a tank on the roof, and should be equipped with an alarm valve.

At least one line of standpipe should be installed, with an outlet at each story. cellar and roof, with sufficient 2½-inch rubber-lined hose of good quality, with a nozzle not smaller than ¾ inch attached, to cover an entire floor area, the standpipe to be supplied from a tank on the roof and a pump in the cellar, with a capacity of not less than 500 gallons per minute.

Fire extinguishers and fire pails filled with water should be distributed throughout the building. Telegraphic communication should be provided with the Fire Department. An interior alarm system should be provided to notify occupants in the case of fire.

Thermostats should be installed throughout the building, connected to an annunciator in the engine room so that any rise in temperature would be noted immediately by the engineer and traced to its source.

The employes should be drilled in the use of house lines, extinguishers, axes, hooks, etc., these to be under the charge of the building superintendent. A competent watchman should be employed and his movements noted by a time clock.

The fire appliances should be inspected and tested at least once each month and the superintendent of the building should be held strictly responsible for the efficiency of the appliances.

**No. 56** EDUCATION ON FIRE PREVENTION.—It has only been a few years since it was considered impossible to arouse public interest or secure co-operation in any way in the great subject of fire prevention and fire protection, as our citizens seemed to feel it was unnecessary as long as the fire insurance companies were ready and able to pay the loss; but, through the persistent efforts of a few earnest workers, the people have begun to realize that the insurance companies act only as agents in collecting and distributing money; hence we now find the business and professional men from all parts of the country taking a deep interest, giving the subject more attention and gradually realizing that a majority of the $250,000,000 of property wasted annually through fire, and which money can never replace, is caused through carelessness; therefore something must be done to prevent it.

The governors of many States have become interested, and each year they proclaim "Fire Prevention Day." A number of our cities have "Clean-up Days" and weeks; our merchants are keeping a closer eye on their places of business; the large manufacturer and big enterprises are giving the matter thought and attention, such as the interest taken by the officials of the Panama-Pacific International Exposition, and the subject will receive a prominent place in the convention of the World's Insurance Congress at the exposition during October, 1915. Architects and builders are giving more attention to fireproof and fire-resisting materials. Model building laws are being considered and adopted; but we must go still further. The minister, the school teacher, the employer and parents must be made to realize the seriousness of the subject and give it the attention, thought and study it must have.

It is not uncommon to hear a sermon on "Politics," "Temperance," "Health," etc., but can any one recall one word from the pulpit on "Fire Prevention" or "Fire Protection"; yet could anything be more worthy or deserving?

The school board finds it necessary to instruct our children in many subjects of interest and importance, which the young mind grasps eagerly, for they are taught from the beginning to know that all they learn in the classroom is not only necessary but perfect; hence consider the

effect a few hours' instructions each week on fire prevention would have on the minds of our children and picture the lasting benefit. The interest taken by our boys in the Boy Scouts spells the answer and indicates the enormous amount of good that can be accomplished through our children. Let us interest this body of sterling young fellows or organize a similar association, for the minute we have the child interested we have stamped out a large amount of our annual fire waste, which is truly a waste of everything man, woman and child have toiled for, everything to which human efforts have imparted value, and last but not least a waste of human life offered up as a sacrifice for the carelessness of someone. Almost any morning we can read in the daily press of some human sacrifice offered up to the "Fire god" for someone's carelessness.

The people must be made to know that our annual fire waste is as great a menace as war, famine or flood. Fire waste emanates largely from criminal indifference; hence should be prevented through laws which would go direct to the very root of the evil, and hold the party on whose premises fire originates criminally liable; when this is done our fire waste and sacrifice of human life will be reduced 75 per cent.

Our fire waste is in a measure responsible for the high cost of living, for it merges with the cost of everything we eat, drink and wear. Year after year $250,000,000 worth of buildings and merchandise are wasted by fire; therefore it is easy to see that the very foundation of our commerce is being consumed by the "Fire god." Tomorrow you may read of another San Francisco or Baltimore conflagration. Can we stand such loss in the present condition of our financial affairs? The financial depression throughout this country is put at the door of the war, but can we not, to a large extent, trace this back to 1906 and 1907 when between two or three hundred millions of securities were thrown on the market by insurance companies to meet the payment of losses? Another conflagration, such as at San Francisco, at this time would cause the worst panic of modern times, place a majority of our manufactories and financial institutions in the hands of receivers, throw thousands out of employment and cause untold hardships and suffering.

In the past we have at least been fortunate in having the big conflagrations occur in periods of mild weather. Picture, if you can, the terrible sufferings and loss of life at a conflagration in one of our large cities in the dead of winter; the blind, sick and dying, the aged and the infants driven from their homes, grand or humble as they may be, to face the wintery blasts in one mass of fleeing humanity. Let every man, woman and child become a committee of one to fight against such a catastrophe. Start now to clean up your home, the office, your place of business; discuss the subject with your family, employes and business associates; give to "fire prevention" just a fraction of the time given to the discussion of the war and watch the results and effects.

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**No. 57** FIRES IN DANCE HALLS.—1:30 a. m. One more dance and the festivities of the foregoing evening would be at an end.

2 a. m. Dance over, and there is a scurrying for hats and coats so as to catch the trolley car which passes the hall at 2:15.

3 a. m. People gone, dance hall closed, locked and left alone.

6 a. m. A milkman sees smoke issuing from the crevices around one of the hall's windows. An alarm of fire is sent in.

6:05 a. m. Firemen, with hose and axes, replace the merrymakers in the dance hall. Fire, burning around a small stage at one end of the large room, had spread to the ceiling and burned its way through floor.

6:20 a. m. Firemen have fire under control.

6:45 a. m. Firemen take up hose and return to quarters.

The above short story is just what happens, and has happened on more than one occasion. Many people jump to the conclusion of "incendiarism." After many inquiries into cases of this kind it has been found that smoking is the

direct cause of these fires. The musicians smoke sometimes, and a discarded match or cigarette butt falls on the stage or on the floor near where they are playing. Often it falls in a crack and smoulders there until a slight draft strikes it, when it flames. Musicians are not always responsible for the fires. Often men who attend the dance light cigarettes or cigars just before they leave for home.

It would be a difficult problem to stop such fires. It is true that they do not happen very often, but when one does occur it gains such headway before being discovered that considerable damage is done before it is extinguished. It would be almost useless to post up "No Smoking" signs, as the rule would always be violated by someone.

If a fireproof flooring could be substituted for every wooden one, dance hall "smoking" fires would be reduced greatly in number.

## PRIZES FOR APRIL ARTICLES.

*First Prize. A tie. Nos.* 51, 52 *and* 53. *C. W. McKeehen, Secretary, State Fire Marshal, Oklahoma City, Okla. C. E. Worthington, Wellesley Hills, Mass. R. R. Faitoute, Secretary, Bureau of Combustibles & Fire Risks, Newark, N. J.*

## COMMENTS BY MEMBERS OF THE COMMITTEE.

In my opinion, No. 53 is the best article, as the writer explains fully the fire hazards of garages in small towns and gives practical suggestions for eliminating such dangers.

❦ ❦ ❦

No. 52 has given to the readers of SAFETY ENGINEERING a wide scope as to his knowledge of fire protection, and the article shows that the writer has an idea on the chemistry of fire, the functions of which are essential in both fire protection and fire extinguishment. The article covers an area for the candidate for promotion in the fire department and gives clear and concise explanations of construction as to the conservation of life and property by fire prevention.

❦ ❦ ❦

In my opinion No. 53 is the article entitled to first prize. It is a plain, practical talk concerning a hazard of a very serious sort; it emphasizes the important fact that the seriousness and prevalence of the hazard discussed is very largely due to indifference and carelessness on the part of garage owners, and to failure on the part of inspection authorities to

## CONDITIONS OF COMPETITION.

*To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of* $10.00 *and one second Prize of* $5.00 *for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The work and efficiency of public fire departments, fire prevention bureaus, and private fire brigades present many important subjects for discussion.*

*Short, practical articles are wanted on every subject that will prove of value to firemen (public or private), and to inspectors and others interested in The Fight Against Fire. Articles may cover methods and practices relating to fire fighting and fire prevention by public departments, faults of construction that create fire perils, the fire hazards of processes that endanger life and property, how firemen and public inspectors may qualify themselves for advancement, the character and use of apparatus and other equipment, private fire brigade organization and drill, employes' exit drills, regulations and requirements of all kinds, etc.*

*In passing upon the articles submitted, the Committee to Award Prizes will be influenced, in each case, by the evidence an article gives of its writer's knowledge of and interest in fire prevention or fire extinguishment, in general, and by the practicability and adaptability of the writer's suggestions and ideas.*

*Articles will be received from any person competent to discuss the question of fire prevention and fire extinguishment. Contributions are especially invited from members of city fire departments and fire prevention bureaus, members of well established private fire brigades, insurance engineers and others. Articles should not exceed the limit of* 800 *words. No consideration of any kind is required for the privilege of competing.*

*Drawings, sketches and photographs may be submitted whenever they will aid or supplement the texts of articles.*

*Blanks upon which to submit articles for this department of SAFETY ENGINEERING will be furnished on application. But any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

# QUESTIONS AND ANSWERS

*Subscribers to* SAFETY ENGINEERING *are invited to ask questions on any phase or problem of fire prevention or fire protection. This includes construction and equipment of buildings, installation and use of apparatus, fire dangers peculiar to industries, etc. Questions received will be published each month, with request for replies by engineers, inspectors, officials and others interested in the subjects presented. If too long for publication, replies will be forwarded by mail direct to the inquirers. It is believed that, by this method, subjects on which there is a desire for special information will be developed. It will also put the authors of articles in touch with inquirers who wish further information on points merely touched upon or not made wholly clear in published articles.*

SULPHURETS. — In Questions and Answers, April number, a reader of SAFETY ENGINEERING asks me, as the author of Article No. 47 in "THE FIGHT AGAINST FIRE," March number, to reply "as to the conditions required to produce spontaneous combustion of sulphur (pure sulphur being understood not sulphurets)." I am pleased to answer that the inquirer has made the discovery of the error and his question answers his interrogation. The word in the copy should have been sulphurets. The article was written hurriedly and was not read by the author, so the mistake crept into the copy and was not discovered by me until I noticed the article. It is evident that the article has been the source of thought by some person desiring information on the subject, and I am glad that he has called the error to my attention, and I assure you that in the future I will revise my articles more carefully than No. 47.

TRASH BURNER. — We are hunting a burner that could be used, in the first place, for the collection of trash, and, in the second, for burning it without hazard to surrounding buildings. If specifications for building such a burner can be had, we would be glad to know where we can obtain them. I. I. B.

secure and enforce proper regulations for the storage and handling of gasoline. In the large cities and towns a great deal has been done toward suitably safeguarding the gasoline hazard, of course; but attention to this matter is still an urgent need in perhaps a majority of the smaller places. It is a thing, it seems to us, that demands vigorous action by fire marshals and other officials. The market is well supplied with standard equipments for handling gasoline, and those who care for them can usually secure proper rules and specifications concerning plants using gasoline without difficulty.

I am of the opinion that the best article is No. 51. I believe the writer brings to attention one, if not the greatest, of the fire hazards—"moral hazards." Overinsuring or issuing policies on buildings or contents for their full value is responsible for more fires, intentional or otherwise, than any other cause. The large number of fires the fire department comes in contact with, that are of an incendiary origin or, to say the least, are suspicious, leads me to believe that no amount of fire prevention can be successful until fire insurance is restricted, so that the owner or occupant assumes part of the risk. Article No. 51 expresses my views fully.

I vote for No. 51 for first prize. The writer explains what he calls the "moral hazard." I consider his ideas some of

the best ways to diminish the enormous ash heap, as they are the first steps to fire prevention in all cases, and fire prevention is the first step to fire extinguishment. If it were compulsory on the part of the insured to carry a portion of his risk, he would take steps to protect that portion. Whereas, if he were allowed to over-insure, he could become careless, and, as it has often happened, the insurance would be too tempting to not try for.

No. 53 has the best article on fire prevention in garages, and, as that line of business is always growing larger, there should be a standard form for every one using gasoline throughout the United States to see that every one employed in garages lives up to the law as to the handling and storing of gasoline. There is danger in careless handling of gasoline, should it explode, as it will cause the fire to spread very rapidly and cause considerable damage to life and property. The writer said that there was gasoline in 5-gallon cans ready to be used. They should be compelled to stop such practices, and should draw it only when needed from portable tanks to the tanks on the automobiles.

I vote in favor of No. 52, because it appears to be a complete exposition of the theory and practice of fireproofing combustible material, and more particularly because it warns against the common erroneous notion that sheet metal laid directly on combustible material is in any sense a heat insulator.

I cast my vote for No. 51, a very short article and a very good one. I consider the subject of it the first stage of fire prevention and a matter that has not been given any consideration up to the present time in regard to fire prevention.

I favor No. 52, entitled "Metal for Fire Protection," as bringing forward a subject which in my opinion has not received sufficient consideration. The article shows a general knowledge of the matter in hand; an important point being the proper metal area for heat conduction and radiation of an exposed metal covered wooden surface. Other points raised are equally as important. I vote for No. 52.

Architects, mill engineers and builders should profit by the advice given by the writer of article No. 52, to whom I give my vote. Metal doors, roofs, fire shutters, etc., especially those covered with tin, would retard combustion and spread of flames better if the precise qualities of the metal were studied before being specified for the same.

No. 53 wins. Conditions, such as the writer mentions, are confronted in nearly all small towns throughout the country. If the proper authorities could read this article, they would probably realize the value of precaution.

I think that all three subjects under "The Fight Against Fire" for April are good. No. 51 should be given careful thought by every one, as it is a very important subject in fire prevention. I will give No. 51 my vote.

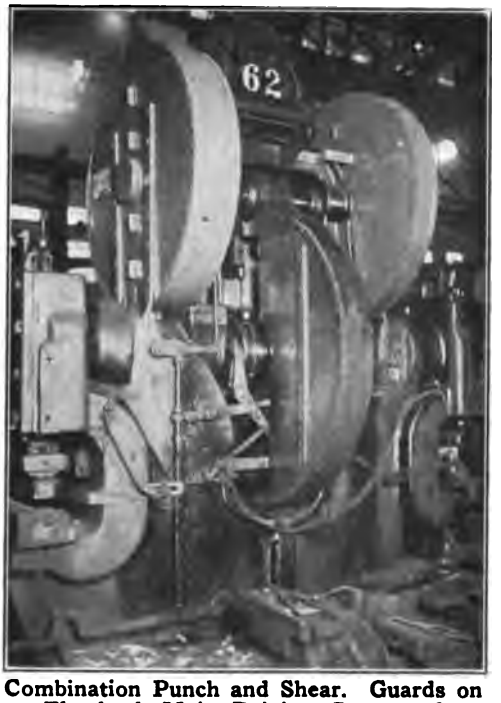
## SAVED BY FIRE DRILL.

A fire in the annex of the State Hospital for the Insane, Dunning, Ill., excited 137 patients, but a panic was averted by a fire drill formation. Sixty-seven patients were in the upper ward and 70 in the first story, awaiting breakfast, when the fire started in one of the walls of the dining room. The order for the fire drill was obeyed promptly and many of the patients were able to take away some of their belongings. The supposition was that a lighted match had been thrown carelessly behind a radiator. The building was destroyed.

If you want to save your job and eyes, wear goggles.—*J. M. Woetz.*

## SUPERIOR TYPE OF SAFEGUARDING.

There is satisfaction in doing a piece of work well and in seeing a piece of work that is well done. That the job of guarding the combination punch and shear, as shown herewith, was well done needs no comment. It speaks for itself.




**Combination Punch and Shear. Guards on Flywheel, Main Driving Gears and Motor Driving Gears.**

The solid construction of the guards appeals to one, as does the neat workmanship. Note the guards on the flywheel, the main driving gears and the motor driving gears. They indicate what is meant by "Universal Safety Standards," when applied in practice.

## INSPECTION OF SAFETY SPECTACLES.

Safety spectacles should be inspected daily. Toolman, foreman or sub-foreman should have care of such inspection. He should be sufficiently familiar with the construction of eye protectors to know at a glance whether or not they are in perfect condition, says a bulletin of the National Safety Council.

It should be the duty of the man in charge to know the following:

That the frames are not bent out of shape; that is, one lens higher than the other, nor so low in front of the workman's eyes as to cause him to constantly look over the frames.

That the screws holding the lenses are not loose.

That the side screens and temples are not damaged or bent.

That the lenses are not cracked, chipped or pitted with emery.

Any of these defects can be seen without removing the goggles from the face or causing any delay in the work.

Defective goggles should be replaced and the old ones laid aside for repairs. Workmen should be impressed with the importance of taking proper care of the goggles that have been furnished to them.

## SAFETY SOCIETY'S OFFICERS.

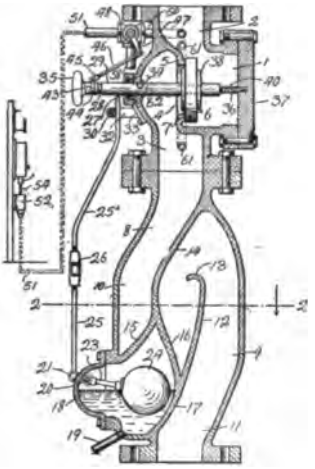
Charles L. Bernheimer was elected president of the Safety First Society of New York City on April 22. He was vice president of the society last year, and he is a director and a member of the executive committee of the Safety First Federation.

Chief Magistrate William McAdoo, President Thomas W. Churchill, of the Board of Education; Police Commissioner Arthur Woods, Fire Commissioner Robert Adamson, William R. Willcox and Jefferson DeMont Thompson were elected vice presidents. The following-named honorary vice presidents were elected: Mrs. Eugene J. Grant, Mrs. Marcus M. Marks, Mrs. Elmer Black, Mrs. Walter Lewisohn, Miss Florence Guernsey and Mrs. William Grant Brown.

The members of the executive committee are: Chairman, Ralph Folks; Robert S. Binkerd, J. A. Ritchie, A. Duncan Reid, Lawrence B. Elliman, Richard W. Meade, Edward R. Hardy, Frank G. Webb, David Beecroft, Mrs. Robert Francis Cartwright.

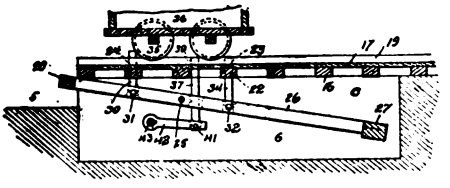
# RECENT INVENTIONS OF SAFETY DEVICES

SAFETY APPLIANCE FOR STEAM ENGINES. William T. Robinson, Ethel, W. Va.



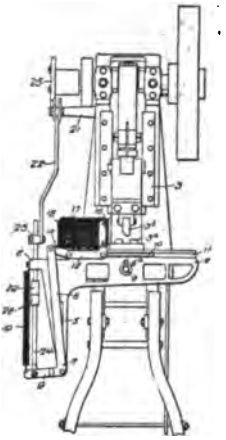
A device of the class described including a body casting having a central vertical wall therein provided with an opening, said casting having chambers arranged upon opposite sides of the central wall and having communication through the opening, a reciprocating valve rod mounted in one side of the casting, a valve carried by said rod and adapted to close the opening in the central wall, a guide pin slidably received within one end of the valve rod which has its outer end mounted in one wall of the casting, a coil spring upon said guide pin adapted to bear against the inner end of the valve rod to retain the valve in its closed position, the outer end of said valve rod having an annular groove therein, a separating chamber within the lower end of the body casting, a float therein, a crank shaft connected with the float, a latch bar having one end connected with the crank shaft and the other end adapted for engagement within the groove in the valve rod to normally retain the valve in an open position against the tension of said spring, and said float being adapted to actuate the latch bar to disengage the same from the groove, and permit of outward reciprocation of the valve rod to close the valve.

SAFETY DEVICE FOR MINE CARS. Ferdinand Davis, Uniontown, Pa.



In combination, a track leading to a hoisting cage shaft, a pit arranged below said track, a normally inclined counter-balance frame pivotally supported in said pit and having its forward end projecting into said shaft and capable of being shifted by the descent of said cage, front and rear stop elements pivotally connected to said frame and capable, when the latter is shifted, of being alternately retracted and projected into the path of travel of cars to release and arrest travel of the cars toward said cage, and vertically movable stops, manually operated, and independent of both the hoisting cage and said first named stop elements, and located intermediate the front and rear stop elements first named.

SAFETY DEVICE FOR STAMPING MACHINES, &C. Konstantine Thulander, Rockford, Ill., assignor to National Lock Company.



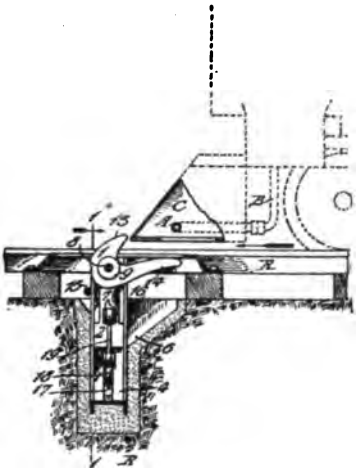
In a machine having a dangerous part intermittently operating, a vertically disposed rigidly constructed safety gate horizontally reciprocating in a substantially straight line and adapted to be interposed between the said dangerous part and the hand of the operator, mechanism adapted to hold said gate out of the way of the operator when the said dangerous part is idle, and a spring so disposed as to move the gate to an operative position when released by said holding mechanism.

SAFETY DEVICE FOR ELEVATORS. Edward A. Smith, New York, N. Y., assignor to Otis Elevator Company.

The combination of an elevator car, a clamping device therefor, guide rails coöperating with said car and device, and a differential screw having a high pitch thread and a low pitch thread for actuating the clamping device, coöperating parts in engagement with said threads with different degrees of friction, the operation of said screw being controlled by the

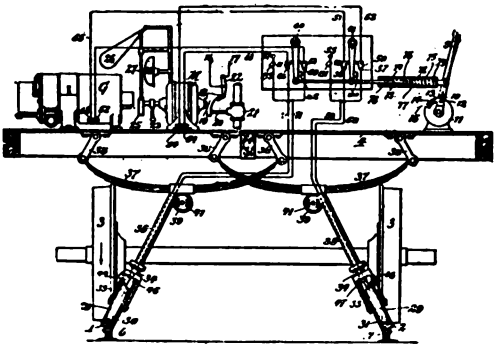
difference of friction between the high and low pitch threads and coöperating parts, so that the low pitch thread is brought into operation, and the high pitch thread is held from operation by the resistance encountered when clamping device engages the guide rails.

SAFETY DEVICE FOR RAILWAYS. Joseph Fiddler Graybill, York, Pa.



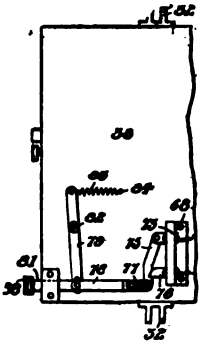
A safety appliance for actuating air brakes comprising a casing adapted to be mounted in a pit between the track rails, laterally spaced vertically disposed guides arranged in said casing, a head slidably mounted in said guides, a lever rotatably mounted on said head and having arms positioned one to be engaged by a passing train and the other for upward projection on the engagement of said first mentioned arm by said passing train, and coöperating means on said head and lever for yieldably locking said lever in adjusted position and means for reciprocating said head.

SAFETY APPARATUS FOR RAILWAY SYSTEMS. Albert Pecorella, Buffalo, N. Y.



A safety apparatus for railway systems comprising electric conductors arranged lengthwise of the tracks, and instrumentalities arranged on a car of each train comprising contacts engaging with said conductors and tracks, an electric generator, an electrical translating device, and means for reversing the polarity of said translating device and said generator comprising a pole reversing switch for said translating device having a switch lever, a pole reversing switch for said generator having a switch lever, an operating lever, a segment, a catch on said operating lever adapted to engage different parts of said segment, and a yielding connection between said operating lever and said switch levers, said element being so connected that the electrical translating device of each train is adapted to be arranged in circuit with the generator of another train.

ELEVATOR SAFETY DEVICE. Emery Bársony, Castleton-on-Hudson, N. Y.



A device of the class described comprising an elevator shaft, a car vertically movable therein, a shaft door and a car door, a motive power switch upon said car and means for automatically releasing the said switch upon the opening of said doors.

## ELECTRIC LIGHT AND POWER.

The third quinquennial report on central electric light and power stations and street and electric railways in the United States, relating to 1912, has been issued by the Bureau of the Census. It has detailed statistics as to the development of the industries, output, equipment, finances, traffic, employes, salaries and wages, with descriptive and analytical text and numerous diagrams and other illustrations. Interesting features of the report are two articles by Thomas C. Martin, secretary of the National Electric Light Association, one discussing the recent developments and advances in the light and power station industry and the other dealing with street and electric railways.

## LITTLE THINGS.

There is the greatest need, in this city and in this age for a crusade of safety, for impressing upon the minds of our people the need for exercising care in the seemingly little things, such as crossing the street, lighting the gas or fire, throwing a match away, alighting from the car, etc., said President Churchill, of the Board of Education, New York City.

# MATERIALS, APPARATUS, PROCESSES

## MARX FIRE-RESISTING PUTTY.

That "a chain is no stronger than its weakest link," needs no argument; hence in the glazing of wireglass windows too much attention can not be given to the putty used.

"John Marx Fire Resisting Putty," as demonstrated by actual service in modern buildings, provides "Safety First" and adds to the durability of fireproof windows.

The tests and examinations of this putty by Underwriters' Laboratories, Inc., indicate that it does not give off smoke in excessive volume when heated, and it is not readily flammable. It adheres strongly to glass and steel and withstands the effects of long exposure to weather without material deterioration.

This putty is examined regularly and tested under the supervision of Underwriters' Laboratories at the factory and packed in receptacles that bear the Underwriters' label, series A.

Features possessed by this putty are: It adheres to the sash members sufficiently to permit the installation of the glass and is soft enough to permit the glass to be pressed into proper position. After hardening, it adheres to the sash members and the glass but retains sufficient flexibility to prevent the cracking of the glass as a result of expansion and contraction and stresses due to the operation of the sash. It will resist for indefinite periods all conditions of actual service; will withstand exposure to the high temperatures, and if installed properly, will remain in position and prevent the passage of fire and smoke around the edges of wireglass. It is of such consistency that it will remain in the grooves of fire windows after they have been exposed to severe fire and subjected to the action of fire hose streams.

The "Marx" fire-resisting putty is used on metallic window frames and sashes manufactured by S. H. Pomeroy & Co., Inc., and therefore is in service in frames and sash of the new building at the Thomas A. Edison plant. Among other modern buildings in the window frames and sash of which the putty has been used, are those of National Biscuit Co., Fiss, Doer & Carroll, New York Transportation Co., Metropolitan Street R. R. Co. car house, Schwarzchild & Sulzberger, and Monolith Building, New York; Bush Terminal Co., Kirkham Soap Co., and the McClure Building, Brooklyn and Long Island City; Keuffel & Esser, Hoboken, and Colgate & Co., Jersey City.

A booklet, describing this fire-resisting putty, its composition, practicability, durability, fire retardant properties, fire hose stream resistance, and giving a long list of buildings in which it is rendering satisfactory service, may be obtained by addressing, John Marx, 54-56 Paterson avenue, Hoboken, N. J.

## SAFETY METHODS LOWER INSURANCE RATES.

A marked example of what "Safety First" methods will accomplish, has recently been demonstrated in the works of the Buffalo Bolt Co., North Tonawanda, N. Y. The company, by the installation of substantial

**Improved Type of Guards in Buffalo Bolt Co. Works. Furnished by Lockhart-Hodge Co.**

guards, changing the location of machines, belt drives, etc., has secured a reduction in their liability insurance rate from $1.25 to 98 cents.

The guards, some views of which are shown herewith, are of the most improved type, and they were furnished by the Lockhart-Hodge Co., Inc., 25 Waverly street, Buffalo, N. Y., whose guards for circular saws, band saws, shapers, jointers, lathes, belts, gears etc., are so favorably known and largely used.

**Substantial Guards That Helped Reduce Insurance Rates for Buffalo Bolt Co.**

The Lockhart-Hodge Co., Inc., has made a careful study of the effective guarding of hazardous places in industrial plants, the spots so often the cause of serious accidents; and to help manufacturers make their plants safe, thus securing the benefit of increased output and lower liability insurance rates, the company makes special guards to meet requirements.

The Buffalo Bolt Co. is to be congratulated on the success of the steps taken to secure "Safety First" for its employes and on the reduced liability insurance rate it secured through enterprise and care; also the Lockhart-Hodge Co.. Inc., on the important part the guards it furnished played in getting the reduced rate.

## SAFE GERM-PROOF DRINKING FOUNTAIN.

The public drinking cup is so well recognized as a menace to public health that it has been practically abolished by legislation. That it was a wise step was proved by an examination of a drinking cup under a microscope recently, showing that, in a space no larger than the head of a pin on the brim of a cup which had been used nine days in a school, there were more than 1,000 germs. By examining numerous areas it was estimated that the surface of the brim likely to be touched by the lips in drinking, bore no less than 5,000,000 germs, while other millions lingered deeper in the cup.

Although drinking fountains are taking the places of public drinking cups in many cities, it is a mistake to suppose that all drinking fountains protect the user from disease infection. Statistics show that many so-called sanitary fountains frequently permit the lips of the user to come in contact with the nozzle of the fixture, and where such conditions exist the fountain becomes a veritable breeding ground for millions of bacteria.

Investigations by boards of health and sanitary officers have fastened the blame for numerous epidemics upon the faulty construction of drinking fountains.

The Johns-Manville Co., Madison avenue and 41st street, New York, with offices and sales rooms in nearly all of the large cities, manufacture a drinking fountain that eliminates danger from disease germs.

The J-M "Sanitor" drinking fountain is claimed to be the only one which prevents the lips from coming in contact with any part of the metal while in use. Another unique feature in the construction of this germ-proof fountain is that the waste water from the user's lips cannot fall back on the discharge nozzle to cause contamination.

In the "Sanitor" drinking fountain, illustrations of which are shown herewith, instead of a single nozzle, as customary in most fountains, eight small jets converge in the center of the rim, forming a smooth column of water. Drinking from the "Sanitor," therefore, is the same as drinking from a running spring. The waste water is carried off without contaminating the fountain, and there is no place where germs can find lodgment. No chance of infection.

Many isolated cases of virulent disease have been traced to the unsanitary drinking fountain and cup, and it has been said that the mediums of disease transmission

**J-M Sanitor Drinking Fountain Head.**

are responsible for epidemics which have run through schools and factories, lowering the vitality of the pupils and the efficiency of industrial workers. It would seem that the remedy for the conditions is the use of a fountain that cannot carry germs.

The J-M "Sanitor" fountain-head is of

solid brass, nickeled, and owing to the substantial construction it is practically proof against injury at the hands of malicious individuals. Another feature of this type of drinking fountain is that there is no sharp nozzle to cause injury. Several cases are on record in which children have been injured by sharp nozzles. In one instance, a boy, while drinking, was hit on the head by another boy, the blow driving the sharp nozzle through the nose. Blood poisoning set in, later resulting in death. Under similar circumstances, another boy had his front teeth broken against the porcelain

**J - M Sanitor Drinking Fountain Built to Withstand the Rough Usage Met with in Industrial Plants.**

edge of the fountain. Owing to its construction, such accidents are impossible with the J-M "Sanitor" fountain.

A handsome book, descriptive of this germ-proof, "Safety First" drinking device, noted for its economy of water, has been published by the Johns-Manville Co., and it is to be sent free on request to the company.

## CORK COMPOSITION FLOORING.

"Cork Composition Flooring," as the name implies, is a composition, with cork as one of its component parts, in which 50 per cent of the composition has been replaced by chipped cork. This new flooring has come into general use because it ranks high in the qualities of fire resistance, resilience, lightness, quietness, non-slippiness and durability. It makes an attractive floor, easy to the tread and resembling terrazzo in appearance.

The Troegerlith Tile Company, 103 Park avenue, New York, originated this cork composition floor, which bonds directly to concrete, metal or wooden foundations. A special advantage of the new composition is that it will not absorb dirt and dust, and it has the quietness and durability which are essential in a cork floor.

This material has many uses, and it has found a favor for installations where steel stair treads and risers are used in the modern building construction.

Troegerlith cork composition is nearly as light in weight as a pure cork flooring, weighing less than two pounds to the square foot in the finished floor. Usually it is laid plastic in one layer, ½ an inch thick, hardening in from 12 to 14 hours. It is then machine surfaced so that the small grains of cork are exposed, which gives to the floor an attractive appearance.

The nature of this composition compels its use in kitchens, lobbies, elevators and wherever constant use calls for a floor especially easy to walk upon.

Among other recent installations in New York City are Fleischman, florist, Fifth avenue and 42nd street; Freundschaft Society Building, 105 West 57th street, kitchen and pantries; John Jay Pavillion, 76th-78th streets and East End avenue; Hof Brau Haus, Broadway and 30th street, cafe and barroom floors; Mary Elizabeth Tea Room, 36th street and Fifth avenue, cork composition behind counters and in kitchen; Goeler Building, 402 Fifth avenue, stair treads; Lorber's restaurant annex, 1418 Broadway; International Mercantile Marine, 11 Broadway, office; India House, 1 and 3 Hanover Square; Columbia Club, 18 Gramercy Park, basement; Tech Club, 17 Gramercy Park, cork composition in

**Goelet Building, New York. Troegerlith Cork Composition Used on Stair Treads.**

billiard room and regular material in cafe.

Due to the constantly increasing demand for Troegerlith composition flooring and Troegerlith plastic composition, the Troegerlith Tile Co., formerly located at 11 Broadway, has moved into larger offices at 103 Park avenue, New York.

## WHEN THE "SAFETY FIRST" MOVEMENT WAS NEW.

It will interest manufacturers in whose plants eye protection is necessary, to know that as early as 1897, systematic eye protection was in operation in the plant of the Crane Company, Chicago, at which time that company began to provide eye protectors for its men.

In 1898 the work was put on a systematic basis. Safety glasses were given to the men free of charge, and operators were required, as far as possible, to wear the glasses constantly when they were exposed to flying bits of metal, emery dust, glare and hot metal.

Dr. A. M. Harvey, who at the time was, and still is, the chief surgeon of that company, was the originator of this plan of providing glasses for the men, and the fact that since the company began to provide glasses, eye injuries have been cut down to an extremely low point proves the value of having workmen protect their eyes in the shops.

The Crane Company posted signs conspicuously at various points in the shop drawing the attention of the men to the necessity of using glasses and the fact that the glasses were provided by the company free of charge. Today the company is one of the best known industrial companies in the safety movement, and much of its success is due to the activity and thoroughness of Dr. A. M. Harvey.

## FIREPROOF AND SLIP-PROOF STAIR CONSTRUCTION.

A number of suggestions for fireproof and slip-proof stair construction, which will prove of service to architects, builders and property owners, are given in a book issued for free distribution by the American Abrasive Metals Co., 50 Church street, New York.

In all types of structures the elimination of hazards is being encouraged by progressive casualty insurance companies; therefore the suggestions contained in this book are timely and helpful.

Features of the book are several drawings, printed so that they may be used, with proper dimensions inserted, as structural detail drawings, and blue prints may be made from them.

A schedule of proper proportioning of treads and risers, as adopted by the United States Steel Corporation, is given also.

## MISCELLANEOUS ITEMS.

In the purchase of materials and manufactured articles the "Safety First" movement has left its mark. Quality and efficiency are becoming stronger factors each day, and frequently they outweigh those of cost.

During nearly seventy-five years, beginning in 1842, quality has been the prime factor of the E. Howard Clock Co., Boston, and the entire effort of the company has been directed to the production, not merely of clocks, but of the best clocks, made in the best possible manner, the matter of profit being always a secondary consideration.

The equipping of such well known department stores as those of B. Altman & Co.; New York; Jordan & Marsh, Houghton & Dutton and R. H. White, Boston, with Howard clocks illustrates the careful attention given to quality, and Howard time and Howard quality are recognized everywhere as standard.

Other recent installations of Howard clocks are in the Hotel Traymore, Atlantic City, and the Statler Hotel, Detroit.

The Peelle Company, manufacturers of "Peelle" truckable, counterbalance, fireproof freight elevator doors, has, on account of increased business, moved its New York offices from 123 Liberty street to the Park Row building, 13-21 Park Row.

Manufacturers' Issue "C," Automatic Sprinkler, manufactured by Automatic Sprinkler Co. of America, 123 William street, New York, has been approved by the Underwriters' Laboratories. In the April issued, the approval was mentioned as that of Associate Issue "C," instead of Manufacturers' Issue "C."

The Safe-Cabinet Company, Marietta, Ohio, reports that the "Safe-Cabinet" of the Underwriters' Model has been selected by the Penn Mutual Life Insurance Company of Philadelphia for the protection of the company's records in its new home office building, one of the finest examples of modern fireproof building construction. The contract, which, it is claimed, is the largest single order ever given for stock products in the insulated cabinet field, was awarded only after thorough personal investigation of their purchasing agents, including a visit to the Safe-Cabinet Company's plants and the witnessing of a series of fire tests. Those whose problems involve the security of records, and the keeping of them beyond the reach of fire and chance of loss by careless handling, will be interested in information on the results of a series of recent tests made with "Safe-Cabinets," published for free distribution by the company that manufactures them.

# UNDERWRITERS' LABORATORIES'

## Recent Approvals and Reapprovals

**The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.**

**The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.**

ATTACHMENT PLUGS, FUSELESS. American Electric Heater Co., Detroit, Mich. Mfd. by Peru Electric Co., Peru, Ind. Composition cap and porcelain base, 660 W., 250 V.

ATTACHMENT PLUGS, FUSELESS. Arrow Electric Co., mfr., 103 Hawthorne St., Hartford, Conn.; 660 W., 250 V.; 250 W., 250 V., with pull socket.

ATTACHMENT PLUGS, FUSELESS. Hubbell, Inc., Harvey, mfr., Bridgeport, Conn. Signal Attachment Plug Cap. A special base carries contacts for "Hubbell" attachment plugs and receptacles, terminals for a flexible cord, and a socket and wire lamp guard for a candelabra lamp in parallel with device supplied through cord. 10 A., 125 V.

ARC LAMP FEED Royal Projector Co., mfr., 617 W. Jackson Blvd., Chicago, Ill. This device consists of a current relay so designed that decrease in current, due to burning away of carbons, closes contact which actuates a relay, causing ratchet to engage with ratchet wheel on adjusting arbor of arc lamp, feeding carbons.

CABINETS. Federal Electric Co., The, mfr., Pittsburgh, Pa. Cabinets shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters and examined at factories and passed by Underwriters' Laboratories, have labels attached to each cabinet.

DOORS AND SHUTTERS, METAL. Empire Art Metal Co., Inc., The, mfr., College Point, N. Y. Fire Door for Openings in Fire Walls. Door made of black sheet steel. Stiles and rails of hollow construction lined with asbestos. Panel 1 in. thick and filled with asbestos. Single swinging doors are standard for openings not exceeding 4 ft. wide by 8 ft. high in fire walls when equipped with a standard 3-point locking mechanism and when mounted in standard frames.

DOORS AND SHUTTERS, METAL-CLAD. Acme Fire Door & Window Co., mfr., 531 W. 46th St., New York, N. Y. Tin-clad fire doors and shutters, constructed in accordance with the requirements of the National Board of Fire Underwriters. Designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. Hawbolt, Charles H., mfr., 57 Union St., Portland, Me. Tin-clad fire doors and shutters. Designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. Matthews, A., Ltd., mfr., 256-258 Adelaide St., W., Toronto, Canada. Tin-clad fire doors and shutters, constructed in accordance with requirements of National Board of Fire Underwriters. Designed for protection of openings in walls and partitions

DOORS AND SHUTTERS, METAL-CLAD. McGuire, Chas. F., mfr., 4401 Fourth Ave., Brooklyn, N. Y. Tin-clad fire doors and shutters. Designed for protection of openings in walls and partitions.

FLEXIBLE TUBING FASTENER. Hopson, Thomas H., mfr., 218 Wellington St., Ottawa, Ont. For use in securing flexible tubing at outlets.

FUSIBLE LINK. Allith Manufacturing Co., Limited, mfr., Hamilton, Ont. Yates-Allith Fusible Link. For use in connection with automatic closing devices for doors, windows and other automatic devices requiring fusible links.

GASOLENE, OIL DISTRIBUTION SYSTEM. Milwaukee Lighting System (Individual Generator). The Tures Mfg. Co., mfr., 392 Sixth St., Milwaukee, Wis. Gasolene lighting system consisting of a gasolene storage tank, lamps and the necessary connecting tubing. The tank is to be located out-of-doors and rules for installation observed. (Class C. National Board Rules.)

HEATERS, ELECTRIC. Caloric Co., The, mfr., Janesville, Wis. "Caloric" Automatic Electric Fireless Cookstove. This device consists of a heating element under a boiler, both packed in mineral wool and enclosed in a sheet-metal box. A switch mounted in cover is operated by movement of a valve whose motion is actuated by pressure of steam generated in boiler.

HEATERS, ELECTRIC. Hotpoint Electric Heating Co., mfr., Ontario, Cal. Hotpoint Air Heaters. These heaters each consist of a helical resistance coil enclosed in a perforated steel case provided with supporting legs and with a standard three-heat switch. 1000-3000 W., 110-220 V. These heaters are judged to be less hazardous than stoves and heaters used for same purpose, which depend on direct combustion of fuel for heat.

HEATERS, ELECTRIC. Stand for Pressing Iron. McKinney, E. P., mfr., 188 State St., Binghamton, N. Y. Protector. Nickel-plated steel stand, made of two pieces of steel, riveted together and separated by two asbestos discs.

HEATERS, ELECTRIC. Majestic Electric Development Co., mfr., 428 O'Farrell St., San Francisco, Cal. Majestic Air Heater. Rating, 8.8 A., 110 V.

HOSE, RUBBER LINED. Dunlop Tire & Rubber Goods Co., Ltd. 244 Booth Ave., Toronto, Ontario, Canada. Cotton Rubber Lined Hose, either single, double or triple jacketed, and Rubber Hose, all sizes, for Fire Department use. Cotton Rubber Lined Hose for Mill Yard use, single jacketed.

INSULATING PAINT. T. J. Hadley, mfr., Brunswick Hotel, Winnipeg, Canada. A black liquid, drying with a gloss finish and remaining soft and pliable.

LAMP ADJUSTER. Lamb Bros. & Greene, mfr., Nappanee, Ind. "L. B. & G." Adjuster for open wiring and pendent lamps.

LIGHTNING RODS. Ajax Lightning Conductor Co., mfr., 412-422 N. Sangamon St., Chicago, Ill. This manufacturer makes a specialty of installations where subject to corrosion, and furnishes lightning rods and fittings equipped with lead protective coatings.

LIGHTNING RODS. Goshen Lightning Rod Co., mfr., Goshen, Ind.

LIGHTNING RODS. Kress Co., Geo. R., mfr., 1900 Brighton Rd., Pittsburgh, Pa.

MOULDING FITTINGS. Pague Mfg. Co., mfr., 411 S. Clinton St., Chicago, Ill. Fittings for use with "Pagrip" metal moulding, couplings, crosses, tees, elbows.

MOULDING FITTINGS. Phelps, J. C., mfr., 392 Main St., Springfield, Mass. Junction and outlet boxes for use with National Moulding.

POPCORN AND PEANUT MACHINE. Cretors & Co., mfr., 22nd and Jefferson St., Chicago, Ill. Cretors Corn Poppers and Peanut Roasters.

SAFE, LIGHT WEIGHT. Safe-Cabinet Co., The, mfr., Marietta, O. Light weight sheet steel safe. Walls double, about 3½ ins. apart, with heat insulating materials and air spaces between. Doors close into grooves and rabbets. Safes less than 20 ins. wide provided with one door and those wider than 20 ins. with two doors meeting at middle of opening. Doors held closed with interlocking tongues and grooves, hinges, and with bolts at top, middle and bottom; and locked with combination or key lock. Interior may be provided with practically any standard form of filing devices. Weight of largest standard size about 1,000 lbs. with representative equipment of metal filing devices. This light weight safe has been shown by tests to be capable of protecting records, papers and similar contents from destruction by severe fire of considerable duration and of withstanding moderate impact as result of falling, or of blows from falling bodies.

SCAFFOLDING MACHINE. Patent Scaffolding Co., The, 647 West 50th St., New York, N. Y. Two manually-operated ratchet-controlled hoisting drums mounted in frames attached to opposite ends of double angle-iron putlog. Hoisting cables suspended from standard steel I-beam overhead outrigger and wound on drums.

SHADEHOLDERS. Bryant Electric Co., The, mfr., Bridgeport, Conn. Uno shadeholders, designed to thread over spiral socket shells as supplied on Bryant or Perkins sockets and receptacles.

SIGNS, ELECTRIC. Northwestern Electric Works, mfr., 7-10-22 Corn Exchange, Minneapolis, Minn.

SWITCH BOXES. Frankel Light Co., mfr., 5016 Woodland Ave., Cleveland, O. Pressed steel "Ohio" boxes in single units for use with flexible tubing. These boxes have removable sides and suitable fastenings for assembly in gangs.

TESTING CABINET. Hardy & Co., F. A., mfr., 10 S. Wabash Ave., Chicago, Ill. Electrically-illuminated optical test chart and enclosing cabinet for use by oculists. Ophthalmometer. An optical instrument for measuring radius of curvature of cornea by reflected images. Illumination for this instrument is obtained from four candelabra incandescent lamps.

WINDOWS. Riddell & Son, John E., mfr., 12-14 Ferguson Ave., N., Hamilton, Ont. Hollow metallic window frames and sashes for protection of exterior openings. Double hung.

# RECENT CATALOGUES OF SAFETY DEVICES AND METHODS

**By writing the firms the publications may be obtained without cost.**
**Please mention SAFETY ENGINEERING.**

## Acetylene Lighting Plants.

Oxweld Acetylene Co.,
36th St. and Jasper Place, Chicago, Ill.

Facts on low cost, high grade lighting are given in the catalogues issued by this company. The many advantages of the Pilot lighting plant, which is on the approved list issued by the Underwriters' Laboratories, are given, and its value as an efficient and economical light producer for isolated communities is shown.

## Alundum.

Norton Company, Worcester, Mass.

The electric furnace product, "Alundum," which is described in this book, is a remarkable reproduction of one of the minerals of nature in uniform and unlimited quantity and of a quality superior to the natural product for commercial uses. "Alundum" is artificial corundum made by the Norton Co. and used solely in the manufacture of their grinding wheels and has proved vastly superior to corundum as an abrasive as it possesses in a higher degree than any other abrasive the desirable combination of hardness, sharpness and temper, which make it the most efficient abrasive in grinding metals.

## Carboy Inclinator.

Eimer & Amend, 205-211 Third Ave., New York.

Folder describing the advantage and safety afforded by the Flaherty Carboy Inclinator, a real safety device for handling carboys, and which is made adjustable so it can be used on any standard carboy.

## Feralun.

American Abrasive Metals Co.,
50 Church St., New York.

The value, durability and efficiency of "Feralun" for anti-slip stair treads, steps, running boards, floor plates and kindred tread surfaces; for ladder feet; for liner plates in centrifugal and sand dredging pumps; as liners for rock crushers; elbows for locomotive sanders; dredge pump discharge pipes; for jig grates in washing and sizing anthracite coal; for valve chambers; slush and culm pipes; valves and fittings, and ash and coal conveying pipes as used in large power and other plants, are brought out in this little book. The uses to which "Feralun" has been put and its demonstrated superiority in the forms described, indicate how invaluable it will prove in many other fields where its distinctive qualities are especially adapted.

## Fire Doors and Shutters.

The Kinnear Mfg. Co., Columbus, Ohio.

Handsome 24-page catalogue, 30 illustrations, devoted to the various types of Kinnear Steel Rolling Doors and Shutters manufactured by this firm. Illustrations in the following buildings are shown: Pacific Life Building, Los Angeles, Calif.; Corn Exchange Bank Building and New York Life Building, Chicago; Peninsula Warehouse; H. S. Crocker Company's Factory and Hibernia Bank Building, San Francisco, and Bessemer Buildings, Springfield, Ill., are shown. The Ajax fire door, a new departure, is also described and illustrated. All the products of the Kinnear Manufacturing Co. are manufactured under the specifications of the underwriters.

## Hollow Metal Fire Windows.

S. H. Pomeroy Co., Inc.,
282-296 E. 134th St., New York.

Illustrated folder devoted to the new Pomeroy heavy-gauge double-hung fire window, the latest type of improved fire window designed to take the place of the copper-kalameined construction commonly used for street-front windows and possessing the advantages of greater serviceability and dependability at lower cost. It is claimed that the construction of these windows is so strong that their life will equal the life of the building, and that these windows will increase the renting value of any building.

# SAFETY ENGINEERING

Vol. 29 JUNE, 1915 No. 6

# *Current Comment and News*

THE proceedings of the National Fire Protection Association, at its nineteenth annual meeting, held in New York in May, demonstrated that the association is doing effective work, in increasing measure, as time passes. The N. F. P. A. stands for the encouragement of fire resistive construction; for adequate exit facilities to save life; for laws and ordinances requiring the installation of automatic sprinklers; for fire marshals in every State; for official investigations of the causes of fires; for laws fixing personal liability for damage from fires due to carelessness or neglect; for the systematic inspection of buildings by local firemen and trained building and factory inspectors; for the especial safeguarding of schools, theaters, factories and other places housing many persons; for regulation of the transportation, storage and use of inflammable liquids and explosives; for adequate municipal water supplies for use in conflagrations; for the universal use of the safety match; for the education of children and the public in careful habits regarding the use of fire. Associated with the N. F. P. A. are numerous organizations of a professional and business character. The campaign to reduce the economic waste, as well as the loss of life, by needless fires is making headway steadily, on which fact the nation is to be congratulated. The new president of the N. F. P. A. is Charles E. Meek, of New York, the first vice president is Louis Wiederhold, Jr., of Philadelphia, the second vice president is D. Everett Waid, of New York, the secretary-treasurer is Franklin H. Wentworth, of Boston. The chairman of the Executive Committee is F. J. T. Stewart, of New York, and the other members of the committee are: H. W. Forster, of Philadelphia, E. B. Hatch, of Chicago, H. O. Lacount, of Boston, A. M. Schoen, of Atlanta, and Mason R. Strong, of New York. Reports and discussions of important subjects in the fight against fire appear in this number of SAFETY ENGINEERING. Other reports and discussions are to be published in later numbers.

The National Safety Council is extending the organization of local councils in important industrial centers. Twenty-one or more local councils, whose combined membership represents hundreds of thousands of workmen, are now in operation.

The safety crusade is proving a success. Statistics show a decrease in accidental fatalities. The improved condition is due entirely to the fact that not only have the big transportation companies revised their operating methods, but that the traveling public has become interested in the movement and is slowly but surely beginning to co-operate, said the Memphis *Commercial Appeal*. This is encouraging. A campaign of education always does good. There are some who are so obstinate that they seem to encourage accidents by refusing to obey the posted warning to help secure safety first and make it possible.

In his annual report, Chief Thomas W. Lane, of the Fire Department of Manchester, N. H., says the matter of fire prevention is receiving nearly as much attention throughout the country as fire extinction, and as an important move in that direction, every business or mercantile block hereafter erected in the city should be obliged to install automatic sprinkler systems at least in the basements, and such blocks as are already erected should be compelled to install them within a reasonable length of time.

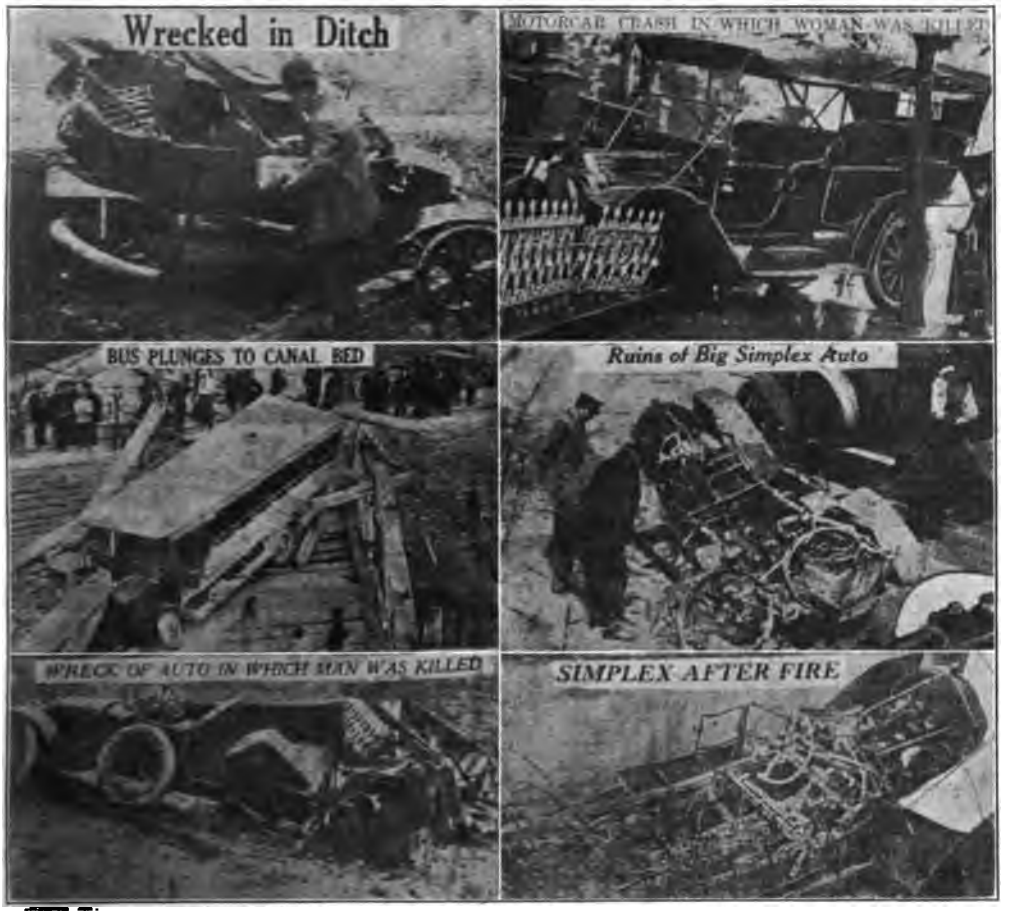
**ROBERT W. CAMPBELL,**
**President, National Safety Council.**

Insurance Commissioner Ekern of Wisconsin has sent a letter to each member of the legislature urging immediate action to protect life and property against the fire hazard in the State charitable and penal institutions. A bureau recommended the installation of sprinkler equipments, espepecially in the hospitals for the insane at Oshkosh and Mendota. The commissioner said it was cheaper to make improvements than to pay fire losses and the families and friends of the helpless inmates had a right to ask that their lives be made safe from the dangers of fire.

To furnish the push behind the plea of intelligent persons for a more deliberate and determined interest in the prevention of street and industrial accidents may be accepted as the motive in the national federation of "Safety First" organizations, as it is the reason back of the formation of local agencies, said the New Bedford *Standard*. Sometimes it looks as though the clubbing inclination was an absolutely irresistible native habit and that nothing would get done that was not part of a concerted movement. The flocking-together, follow-the-leader tendency is demonstrated in the multiplying of clubs and societies and organizations to do what the individual has, finally, after all, to do for himself. But it is true that a good idea takes in proportion as it gets publicity.

Sunday is pre-eminently Death Day for automobilists, said the East St. Louis *Journal*. Long is the register on each Monday of accidents, of injuries inflicted and sustained, far, far too many of them on account of carelessness and want of due precaution and sound judgment on the part of the drivers. The accident roll is increasing too rapidly. The drivers of motor cars must heed the warnings for public safety.

**CHARLES E. MEEK,**
**President, National Fire Protection Association.**


Wrecked in Ditch
MOTOR CAR CRASH IN WHICH WOMAN WAS KILLED
BUS PLUNGES TO CANAL BED
Ruins of Big Simplex Auto
WRECK OF AUTO IN WHICH MAN WAS KILLED
SIMPLEX AFTER FIRE

**DEATH, FIRE AND RUIN.**

The police force of New York has been instructed to obey the following order, relative to street accidents:

When an arrest is made as the result of an accident caused by a vehicle, particularly a motor vehicle, if it is apparent that the accident was caused by some defect in the mechanism of the vehicle, the officer who makes the arrest may detain such vehicle and cause an examination to be made by a competent member of the force designated for that purpose. The services of a mechanic may be obtained by notifying the bureau of telegraph.

If the car is found in good order it will be returned to the owner; otherwise it will be held by the police department until the case is disposed of.

Although unquestionably the addition of a thousand jitney busses, run at high speed, to the vehicles using the streets is the principal cause of the increase in injuries, it is not to be supposed that the carelessness of these or other drivers is responsible for it all, said the Providence *Bulletin*. People afoot are frequently heedless of danger. Everybody must help to reduce the record of accidents.

It should be borne in mind that in every movement like the safety movement one of the first effects is to bring to attention incidents previously disregarded or unrecorded, said the New York *Sun*. Under any conditions the death of an employe would not pass unnoticed, but the adoption of a plan to prevent all accidents might well result in reports on non-fatal misadventures thitherto ignored. This is particularly likely to be the case when the nature of the "Safety First" campaign

is considered. It does not class any preventable accidents as trivial, for its supporters recognize that toleration of minor mishaps inevitably invites greater ones.

The following are the pincipal features of the revised National Building Code of the National Board of Fire Underwriters, which are new, or are distinct departures from the provisions of the old code:

Use of cuts to illustrate methods of construction.

Reference index scattered through the text directing attention to allied subjects.

Introduction of numerous notes, either as words of caution or explaining the necessity for new requirements which otherwise might be obscure.

A broader application of the table covering allowable floor areas, both with and without sprinklers, and more generous allowance for efficient protection.

An entirely new treatment of the subject of exits as affecting safety to life; the basis of computations being the number of occupants, instead of floor area.

Elimination of the use of the term "fire-escape" as represented by ordinary iron balconies connected by ladders or steps as a means of emergency exit, except on existing buildings where it is impossible to get anything better; and substituting in its place the use of horizontal exits, smokeproof towers and outside stairways.

Introduction of an appendix containing a new and useful set of Grading Rules for Timber prepared in co-operation with the United States Forest Service; also a set of tables giving allowable loads on wooden floor timbers, prepared especially for the code, and based upon new stress values for timber.

Specifications for fire tests for floors, partitions, roofings, fire doors and fire windows.

Specifications for correct methods for loading tests on floor construction with diagrams and calculations for same.

General requirements for sprinkler installations in certain classes of occupancy.

Requirement of a certificate of occupancy for a building, thus promoting safety to life and property.

Tenement House Law (which also includes apartment houses) largely amplified. At the earnest solicitation of many building commissioners and civic welfare workers, frame tenements have been restricted to two-family houses not exceeding two and a half stories high.

Regulations bringing the subject of roofings so far as possible into harmony with the new classification of roofings based upon fire tests by the Underwriters' Laboratories. The object being the elimination of inflammable roofings.

Revision of requirements for wall thicknesses, making them consistent, so far as reasonable, with the requirements of the Suggested Ordinance for Small Towns.

Regulations for the use of hollow building blocks for walls, with complete test specifications for different varieties of blocks.

Provisions for use of various new methods of fireproof construction and new materials which have been proven by test to be valuable resistants.

Complete revision of all engineering and fire protection features of the code.

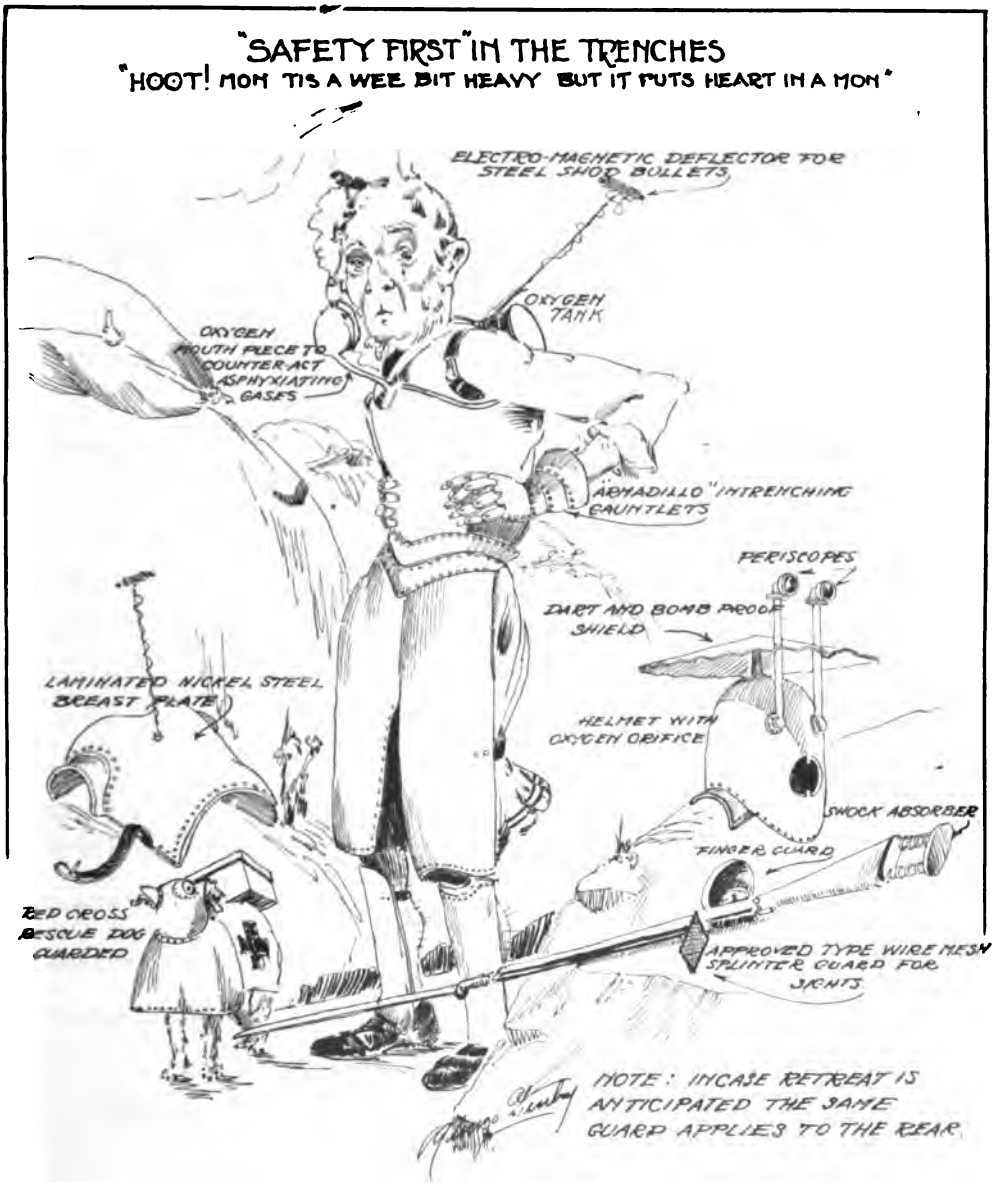
## NATIONAL SAFETY MOVEMENT.

Having the men with you is the first requisite of good safety work and unless this fact is recognized and followed out no campaign for safety will be successful.—*Edward T. Walsh.*

The careful guarding of all machinery and dangerous places and safety rules rigidly enforced are, I believe, the correct methods for attaining perfection of safety.—*R. M. Myers.*

Safety work has a wide economic basis. Every workman ought, from pure self-interest, do all he can to increase the safety and efficiency of a plant.—*R. C. Richards.*

Men must be pulled from the careless "danger habit" of years. When indifference comes in at the door, safety flies out at the window.—*Clifford B. Connelley.*


"SAFETY FIRST" IN THE TRENCHES
"HOOT! MON TIS A WEE BIT HEAVY BUT IT PUTS HEART IN A MON"
ELECTRO-MAGNETIC DEFLECTOR FOR STEEL SHOD BULLETS
OXYGEN TANK
OXYGEN MOUTH PIECE TO COUNTER-ACT ASPHYXIATING GASES
ARMADILLO "INTRENCHING GAUNTLETS
PERISCOPES
DART AND BOMB PROOF SHIELD
LAMINATED NICKEL STEEL BREAST PLATE
HELMET WITH OXYGEN ORIFICE
SHOCK ABSORBER
FINGER GUARD
RED CROSS RESCUE DOG GUARDED
APPROVED TYPE WIRE MESH SPLINTER GUARD FOR SIGHTS
NOTE: INCASE RETREAT IS ANTICIPATED THE SAME GUARD APPLIES TO THE REAR

# National Fire Protection Association

## Resolutions Adopted May 11, 1915

The National Fire Protection Association, assembled in New York City for its nineteenth annual meeting, advocates the following measures in its warfare against the needless sacrifice of human lives and property by fire:

**(1) The encouragement of fire-resistive building construction through the adoption of improved building codes by all States, Cities and Towns; the inclusion in such codes of adequate rules for exit facilities based on the occupancy for all buildings, and the general recognition of the fact that although fire-resistive construction is of the greatest possible importance, it is of itself not sufficient. The lesson of the greatest factory fire of the year is that large industrial buildings, even if built of cement and steel, must be sub-divided by fire walls and must have adequate means of stopping fires in their incipiency.**

**(2) The adoption of laws or ordinances requiring the installation of automatic sprinkler systems as fire extinguishing agents in all factories, commercial establishments and city blocks. The adoption of ordinances requiring the construction of fire division walls not only as a property protection device but as providing the best life-saving exit facility.**

**(3) The establishment by law of a Fire Marshal in every State, who shall not be a mere political officeholder but a trained man with trained assistants competent to direct the work as statistician, educator and prosecutor.**

**(4) The investigation of the cause of all fires by public officials, and the enactment of laws fixing personal liability for damage resulting from fires due to carelessness or neglect.**

**(5) The consolidation of all legal forces so as to provide for the systematic inspection of all buildings by local firemen, and technically trained building and factory inspectors so as to insure the vigorous enforcement of rules for cleanliness, good housekeeping, and the maintenance of safe and unobstructed exits, fire-fighting apparatus and other protective devices.**

**(6) The especial safeguarding of schools, theatres, factories and all other places in which numbers of people congregate or are employed.**

**(7) The vigorous State and municipal regulation of the transportation, storage and use of all inflammable liquids and explosives.**

**(8) A careful study of municipal water supplies, their adequacy and reliability with special reference to their adequacy in case of conflagrations.**

**(9) The universal adoption and use of the safety match.**

**(10) The education of children and the public generally in careful habits regarding the use of fire.**

In the furtherance of these objects the National Fire Protection Association appeals for the co-operation of all citizens. It asks them to help in the dissemination of literature and in the use of the standards of fire protection so carefully worked out by the National Fire Protection Association committees to the end that the lives and substance of the people shall not continue to be dissipated by a reckless and easily preventable waste.

# *Practical Problems in Building Regulation*

*A Round Table Discussion at the Nineteenth Annual Meeting of the National Fire Protection Association.*

THE afternoon session of the National Fire Protection Association on May 12, at the Hotel Astor, New York, was devoted to a general discussion, on the Round Table plan, of Practical Problems in Building Regulation.

Sidney J. Williams, of the Industrial Commission of Wisconsin, was introduced by President Kohn as chairman of the Round Table.

THE CHAIRMAN: This session on Building Regulation has been put into the form of a Round Table Discussion, which we, in the West, know as a sort of a Quaker meeting, in which everyone gets up and tells, in three minutes, what the Lord has done for him. As one of our safety men has said, the Round Table Discussion is where everyone "gets into the game." The game means everyone playing and taking sides; and, of course, it needs an umpire, and the umpire generally gets himself disliked. Your secretary has made me umpire for this session. I do not expect to have any friends left when the game is over, but I am going to enforce the rule of sticking to the subject and keeping within the time limit.

We will take up first the subject of Housing, the relation of housing to this organization and to the building inspector. I have the pleasure of introducing Mr. Lawrence Veiller to lead the discussion. He is secretary of the National Housing Association and is known to all of you as the best known housing reformer in the United States.

BUILDING INSPECTORS AND HOUSING REFORM.

MR. VEILLER: The housing movement in New York City is 70 years of age. Today it is a nation-wide movement, in 56 cities, in 20 to 30 States, and, weigh my words carefully, I cannot think of more than a dozen, or perhaps a baker's dozen, of cities in which building inspectors have taken any interest in housing reform. My topic is the relation of building inspectors to housing reform. It is a broad statement to say that they have taken no interest, but I think it is a true statement that, in the great majority of cases, they have taken very little interest. In some cities, they have been distinctly antagonistic to the interest taken by those advocating laws affecting dwellings and tenement and apartment houses. I have tried to account for this attitude on the part of the average building inspector, and my conclusion is this—there is a false conception on the part of the average building inspector of his duties and functions.

If you ask 99 building inspectors out of 100 whether it is their function to serve the building interests of their communities, to help develop the buildings of their communities, they will say, "Yes." The fact is the building inspector, in every city, has been appointed or elected to enforce laws intended to regulate and control the building interests. He has been put there not to further the building interests but to protect the community against certain elements in the building trade that have erected buildings in so bad a way that the State has had to interfere. So, now, this industry has to be regulated. The real inspector conceives his function to be not to protect the building interests but to protect the community against building interests. We see growing up, entirely outside of the building inspectors' group, other groups, such as the organization that is holding its meeting here today, and a host of other organizations that are called into being in response to a public demand that laws be made, that the enforcement of laws be better, that standards be raised, that efficiency be increased

in connection with administrative building laws. The progressive building inspector will take the initiative instead of waiting for citizens to come to him and sometimes club him into getting better building laws, or a better enforcement.

THE CHAIRMAN: I believe I have read your opinion to the effect that sometimes the cause of reform is made difficult because fire protectionists insist upon such a high grade of construction as to make the tenement out of reach for a man living on a low wage.

PRACTICABLE TYPES OF CONSTRUCTION.

MR. VEILLER: I think that in housing reform any individual who tries to impose on the community so high a standard, from the ideal point of view, that it is impracticable of construction, is doing the cause of housing reform an injury instead of helping it. We must not make the cost of construction so expensive that we cannot build the houses. Therefore, I would caution all housing reformers not to be too extreme in their reforms or in their recommendations, and especially not to be too extreme from the point of view of fire protection. Sometimes we have to choose which of the benefits we would prefer to take and which to avoid, and there may be more important things to have in the living accommodations of the people than protection in case of fire, important as that is.

W. H. COSTER (Pittsburgh): I would like to ask Mr. Veiller what he regards as the lowest type of construction that would be a good investment for a small house, what design would meet the conflagration hazard and be substantial enough to last a sufficient time to be a good investment.

MR. VEILLER: Brick or concrete.

THE CHAIRMAN: One point is how much the building official should have to do with housing; how much it should lie in his department and how much in the health department, for example. I will ask Mr. Oakland of Minnesota, a State that has recently adopted a new housing law, how they draw the line between the building department and the health department.

MR. OAKLAND: The chairman is misinformed concerning a new housing law in Minnesota. A bill passed the senate but never came to a vote in the house. The bill provided that the board of inspectors should have charge of all new construction, and the health department should have charge of repairs and alterations.

THE CHAIRMAN: We would be glad to hear from building officials as to the practices in their localities. There seems to be often the fact that the building department O K's a plan for a tenement house and it is built. Afterwards, it is changed and partitions are put in that were not contemplated in the first place. The building department has washed its hands in the matter and lets it go, has no cognizance of it. The health department disclaims responsibility also. Mr. Veiller, I will ask you how you would take care of that matter.

MR. VEILLER: I think the best method of doing that is in our Tenement House Law of 1901, to require a certificate of occupancy and not to allow any new building to be occupied without a certificate from the enforcing officials, stating that the building is built according to law and stating that the building can be occupied as a tenement, hotel, factory, etc., but providing that the class of occupancy cannot be changed without getting the consent of the same authorities. That is the only practical way of controlling the situation. In the building code drafted by the Joint Committee on City Departments, I believe, that clause was inserted for New York, and in the building code which Mr. Miller is working on that plan is being carried out.

CHARLES W. PHELPS (Binghamton, N. Y.): We take care of that in this manner—the building department has absolute jurisdiction, not only over new construction, but also over repairs. The health department acts only from a sanitary standpoint. The building department has control of all new buildings, all elevators, seating capacity, aisles and exit doors in opera houses, churches, places of public amusement and places where people congregate.

RICHARD L. HUMPHREY: A practice is in vogue in Europe, in which there is

a joint inspection by the departments of a city government which have to do with housing—the health department, the building department, etc. In that way changes, which have not come formally before the proper official, are observed and unsanitary and dangerous conditions are corrected.

THE CHAIRMAN: By joint inspection, do you mean an inspection in which one inspector reports on all conditions, fire inspection, sanitation, etc.?

MR. HUMPHREY: What I referred to was where a committee composed of a representative of each of the departments makes inspections and a report.

THE CHAIRMAN: Would you consider it practicable for one man to make the inspections?

MR. HUMPHREY: I think it practicable, if the one man could look after it.

BUILDING DEPARTMENTS AND "POLITICS."

VIRGIL G. MARANI: The thought suggested by the chairman is one inspector to do the inspecting of all the conditions in a building, following out the card system which Mr. Veiller has installed in his department. It would be perfectly easy for a man with technical knowledge to make an inspection of ventilation, etc., in buildings. One question has not yet been touched upon, the question of politics. The fact is that when you want to simplify your department and curtail expenses, and plan to have one man instead of six, you are throwing out six men's votes. The district councilman will vote against your plan because his constituents own apartment houses, some of which are not fit for human beings to live in. They are the men who oppose reform legislation. The work of this association is an excellent work and it ought to be extended so as to make civil service examinations a real check, so that when political control changes from one body to another, there should be no change in the civil service board. With the tenement house code of Cleveland I am familiar, because when I was building commissioner in that city I tried for two years to start a tenement house code and at that time we had Mr. Veiller to consult with. Yet it was impossible to get a proper start and it was not until I was out of office that I was able, through the Chamber of Commerce of Cleveland, to get work started on the tenement house code. This code has passed recently after three years of continuous work. We had the support of the present building inspector, Mr. Allen, who, I regret, is not here. If we had not had the support of Mr. Allen and the mayor, who is also a member of the Chamber of Commerce, the code would have failed, because the downtown people, who own the rat-traps, were adverse to the code.

Why perplex the owner of a building by having six or more different inspectors call upon him when he is building, each making a report, and then having two or three sanitary inspectors call and make reports, unaware of what has been said by the building inspectors? The owner is flooded with a lot of official literature taking him to task for violations of this or that character. He does not know "where he is at." That is inefficiency in city government. It is impotent as a method for getting a good building, because there is no unification of thought upon the one structure. Among the several inspectors I had, were a butcher, a tailor and a haircutter. I had men who were better than the men who were put out of office to make places for those fellows. What do such men know about building construction, except what they pick up here and there? No wonder builders neglect the orders of the average city department! No wonder owners have a disrespect for the law. As I see it now, it is a great joke to ascertain just how far one can stretch the law to favor a certain political element—to get the best of the other side. It is time this nuisance was stopped. It is time we put our administrative functions into the hands of capable officials who feel that they are public servants, that they should serve the public in an honest, faithful and fearless manner. Until you have men serving the public in that manner and forgetting "politics," you will not have efficient administrative departments.

MR. CROSSLEY (Bridgeport, Conn.): I want to ask if this convention cannot take some action against the omnibus or

6-family frame building? I come from a city which is growing rapidly. All housing facilities are pre-empted. We are informed by one large corporation that by January 1, 1916, we shall be obliged to make accommodations for 10,000 new workmen with their families. At present, movements are on foot to erect large shacks, about 100 6-family houses as closely as they can be erected. Without a building code, and with slight intervention on the part of the State, we are to have inflicted upon us a condition that will probably raise the fire insurance rates in the city.

MR. FORBUSH (Newton, Mass.): The first speaker asked why building inspectors do not take more interest in housing laws. In Massachusetts, the cities and towns change their government generally once a year, and you can appreciate what that means. Now, when a man gets his appointment for one year, and knows that the chances are that the administration will change at the end of the year, and he is a poor man, getting a small salary, and having a family to support—is he going to reform housing laws? He is going to make his job safe. In addition, his duties are usually specifically determined by charter or ordinance. He is there to perform those duties and no other. Unless housing problems are brought into his department and made one of his duties by law, he cannot officially consider them, no matter how much he may wish to do so.

### STATE AND CITY BUILDING CODES.

THE CHAIRMAN: We will pass on to the next topic. We have decided to combine Uniformity in Building Laws and State and City Building Codes, with the idea that they are very closely united. The topic, then, is the State Building Code. Do you want to have State building codes? If so, what should they aim at in purpose and scope? Should they take precedence over a city code? One of the first questions we come to is what sort of uniformity is possible among different communities in the State, communities of different sizes and different locations? I will ask Professor Woolson what sort of unifromity is desirable in a building code?

PROF. IRA H. WOOLSON: The idea of a State or a National building code that would standardize and unify the widely divergent building laws that are now current in different parts of the country is elusive. Anyone can realize the conditions that would accrue from such standardization as fully as one who has had to conduct building operations in different States or even in different cities in the same State. To those acquainted with the laws, their inconsistencies and ofttimes injustice is apparent. Personally, I believe it would be difficult to enact a national law to be applied to the whole country which would properly restrict and not discriminate. Such a national law would need to be exceedingly broad in its interpretation, because of the wide variance in climatic conditions between States like Florida and Maine; and because of the difference in habits of building between States like New York or Pennsylvania and North Dakota or Oregon. My own idea is that it would be better to enact State codes. Such codes could justly be more comprehensive, for the variations in climate and methods of construction would not be great for any single State. What might appear as a contradiction to this expression of opinion, is the fact that I have just completed a revision of the Building Code of the National Board of Fire Underwriters, intended for use in all parts of the United States. However, there is really no inconsistency in this situation. The National Board code is not a law; it is simply a set of recommended building regulations, so arranged as to be easily adopted in whole or in part by any city drafting new building laws. It is a sort of textbook upon the subject of building construction for the use of commissions having such work in hand. When this code was first issued, in 1905, it was drafted with the idea that a city, such as Peoria, Ill., or Lancaster, Pa., could simply write its name in a certain blank space and then adopt the code as a whole. This was found to be impracticable, for each city has a degree of individuality in its construction work and it is quite necessary to draft a building code to fit local conditions. I believe, however, that there are

certain fundamental principles of building construction, from both an engineering and a fire protection standpoint, that could be employed in a uniform manner by architects, for buildings in any city, without hardships to anyone and with great advantage to all. There are many small cities and numerous towns in every State whose municipal records have never been sullied by any restrictions as to how John Jones should construct either his house or his store and no thought has been given to the hazard brought upon the town itself by the careless or ignorant methods of construction which John Jones might employ. Such cities or towns often do not have citizens competent to draft such an ordinance and are usually without funds to publish it, or enforce it if it were prepared. To such municipalities a State code would be a great advantage providing proper provisions were made for its enforcement. Some of the subjects that might properly be treated in such a code without much danger of serious controversy would be:

1. Outline of a plan for indicating fire limits.
2. Limitation of heights for certain classes of construction and occupancy.
3. Restriction of floor areas, with and without sprinklers, for different classes of buildings and occupancy.
4. General specifications for permissible floor loads.
5. General test specifications and allowable working stresses for materials of construction.
6. Establishment of primary rules regarding minimum number, location and construction of means of egress from buildings.
7. Requirements for enclosure of vertical openings; also minimum requirements for protection of horizontal openings where the life hazard or fire hazard is excessive.
8. Rules for safe chimney construction, and the fire stopping of non-fireproof construction.
9. Rules controlling the location of non-fireproof buildings in reference to other buildings, and precautions to be taken when such buildings are near each other.
10. Regulations limiting the use of inflammable roofings.
11. General precautions to be taken to reduce the life and fire hazards in joisted brick, mill and frame construction.
12. General principles of fire resistive construction for both skeleton steel and reinforced concrete construction.
13. Laws controlling the construction and safety equipment of buildings used for public assemblage of any kind.
14. General requirements for light and ventilation. Whether sanitation properly belongs to such a code is questionable.

THE CHAIRMAN: In your opinion, should such a code include the consideration of the conflagration hazard or safety to life on the ground that the city should take care of the conflagration itself?

PROF. WOOLSON: I think the State code might well have fundamental rules which would control the conflagration hazard; that is, the location of non-fireproof buildings, that is, their distance from other buildings; and the question of roofing materials. Those two would have a distinct bearing on that subject.

THE CHAIRMAN: Would you leave it for the city to decide as to what areas those restrictions should apply?

PROF. WOOLSON: I think you would have to. It is pretty hard for a State code to take that into consideration when cities are so different. One might have a river through it; some have very broad streets; others narrow alleys. The conditions are so different that there would have to be local consideration.

COL. YOUNG (North Carolina): How many States have a State building code?

PROF. WOOLSON: So far as I know, Wisconsin is the only State which has adopted a State building code complete. Ohio has adopted parts of such code. Illinois has one under consideration, whether completed or not I am not sure, and I understand the State of Pennsylvania has one nearly ready to

present for consideration and adoption.

COL. YOUNG: You can add North Carolina to that. We have had one over ten years.

THE CHAIRMAN: I thought Ohio was the first State to take up the question of a State building code.

PROF. WOOLSON: It was the first to start.

THE CHAIRMAN: The gentleman said North Carolina has had one for ten years.

### THE STATE CODE OF OHIO.

THE CHAIRMAN: The State code of Ohio was drafted very largely by Mr. Elliott, an architect of Columbus, who is unable to be here today; and as the Ohio code has been the subject of discussion all over the country I am going to read you a brief discussion that Mr. Elliott has been kind enough to send me:

Mr. President and Members of the Fire Prevention Association: I have been asked to speak to you on the subject of State and city codes. I will presume that the necessity for and need of proper building regulations is conceded by the members of the National Fire Prevention Association and, therefore, will offer no argument along this line.

First, should there be a State code? The purpose and intent of building regulations should be the conservation of life, health, limbs, morals and property, and such regulations should be for all and not for a part of the people. And I believe this can only be accomplished through the medium of a State code. Most of the larger cities can and do have building regulations. If building regulations are necessary for the larger cities, then such regulations should be just as necessary for the villages and townships as the life, health, limbs, morals and property of the villager are as dear to him as they are to the citizen of a larger place. At the present time, in the State of Ohio, only six municipalities have building regulations, the combined population of such cities being 1,423,267. The population of the State is 4,767,121, showing that 3,343,854 persons, or 70 per cent of the population of the State are without the protection afforded by building laws. To provide building regulations for one municipality would be prohibitive on account of the cost of preparation and publication. The code for the city of Cleveland cost $65,000, $30,000 for preparation and $35,000 for publication. Cleveland's proportionate share in the cost of preparing the code was but $1,497, but statutes of Ohio provide that all municipal ordinances shall be published twice in three different newspapers, the cost of which is the greatest handicap to municipal codes in this State. There are in the State of Ohio 781 municipal corporations, which would mean 781 separate and distinct building codes to govern the construction of building in municipalities alone. If such 781 municipal codes were possible, what would become of the buildings erected beyond the corporate limits of such municipalities? Buildings thus excluded would include many State institutions, summer hotels, country homes, churches and schools. To afford protection for these buildings would mean more codes and there are 1,373 townships in Ohio.

Second, what should be the purpose and scope of the State code? The purpose should be, as previously stated, the conservation of life, health, limbs, morals and property, and the scope should be of such a latitude as to safeguard and protect such vital interests, and such code should be detailed and not general in its requirements. I believe that all codes should provide for maintenance regulations in order that the construction, devices and equipment prescribed by building regulations shall be properly maintained and not retrograde to uselessness through neglect, carelessness, ignorance and misuse. I believe that municipalities should be permitted to enact additional and more stringent regulations. Such additional and more stringent regulations should include the following: The establishment of fire limits and additional regulations therein; block inspections prohibiting the erection and maintenance of buildings and the conduct of pursuits offensive or detrimental to property or persons in such neighborhood; street encroachments, billboards, lumber yards, residences, sheds and small structures.

Third, should a State code take precedence over city codes? Municipalities are subdivisions of the State and the State is not a part of any city. A State building law should govern, therefore, all of the people of the State the same as any other statute. A State law which would exempt from its provisions any municipality or class of persons would be class legislation and unconstitutional. And, further, no municipality has the legal or implied right to enact laws which conflict with the Constitution or statutes of the State.

Fourth, how should a State code be enforced? I believe, with a State code in effect, that the legislature should by statutes order and direct each and every municipality with a population of 10,000 or more to create and maintain a building inspection department to enforce the provisions of the State code. And that the said department of building inspection should enforce the law in the smaller municipalities and townships. The State department should be the administrative head of all inspection departments and should have the right to super-

sede the local department when the law is ignored or not enforced. I believe that these departments should be self-sustaining by permit or inspection fees, thereby placing the burden of expense upon the persons receiving the benefit of and causing such expense.

Fifth, government tests. I recommend government standards and tests.

Sixth, detailed codes. I believe that codes should be detailed and not general in their provisions, and that they should remove as far as possible the discretionary power of the enforcing officer, and that a State Board of Appeals should be created to decide when a device or method of construction complies with the purpose and intent of the law.

THE CHAIRMAN: Perhaps it would be appropriate immediately after this if we could hear from some of the people who are here from Ohio as to how in their opinion the Ohio code has worked out.

A CRITICISM OF THE OHIO CODE.

VIRGIL G. MARANI: I have been very much disliked by the Columbus people for my opposition to the State code. I think the tendency is to make the code too much of a treatise on the subject of architecture and engineering, thereby encouraging the ordinary man to follow it entirely. A great many incompetent engineers and architects "hang up their shingles" and practice, and they have been encouraged to do so by reading building codes. It tells them just how to do everything. Cleveland is inflicted with a $65,000 building code and a 10-cent organization to enforce it. Every change of administration causes the architects to ask for a copy of the new building code. It is the same old code, interpreted in a new manner by a new interpreter. Therefore I say a detailed and specific building code is not advisable. Get up a smaller code, but enforce it 100 per cent and enforce it alike upon everybody, all the time. That instrument will bring better results than a $65,000 building code, 33 per cent enforced by one interpreter, and so on *ad infinitum*. The situation is ridiculous. It is unfair to the architect and unfair to the engineer and unfair to the administrative officer who has to enforce it. Get your codes down to earth, down to a practical working basis, and you can only do that by having a code that covers the absolute elements of safe and sane construction. Directly you tell a man how to build a fire escape, the size of holes that go through a wall, how they go through, the size of the washer on the other side of the wall, the number of turns to give a nut, it is a desperate time for an engineer and he may as well quit business and go to somebody else to get a job. Why not say a fire escape with a certain rise and tread to the steps, with strength sufficient to carry a certain specified weight should be constructed, and stop there? You can say it in five lines. The Ohio building code on fire escapes covers about 11 pages. If you want a building code of common sense, my suggestion is this: Make you administration as clear as you possibly can. Call for competent plans, submitted by competent engineers and architects and make the requirements of those plans so strict that nobody but a competent architect or engineer can draw the plans. Then you have solved 90 per cent of your problems. You cannot tell a competent engineer how to build, as you have now in the revised steel section of the Cleveland Building Code. Nobody that I have met can follow the Cleveland code. The limit of the columns usually designed fall within the formula, but what's the use of a formula that a man cannot understand? I prefer to have a State code, if possible, covering only the things that will insure safe building construction, the kind and nature of buildings that should be occupied for certain specific purposes. If you want to say school houses over one-story shall be fireproof, let the local code go into more detail as to what is considered to be a fireproof structure. Each city, according to its requirements, could go into the details of fire test requirements as it saw fit, or as it seems necessary.

THE CHAIRMAN: What would happen in small towns if there was no one in the town who knew what a fire test is?

MR. MARANI: If I were in a small town and a State code said that a material used for a certain purpose, following the thought of this organiza-

tion, should stand a fire test, and if a man wanted to use it, I would pick it up and say to him that it is so and so and that it should stand a test of 1,700 degrees for two hours. And he would say, "It has stood such a test." Yes, but you will have to show me where it has stood such a test. I would insist upon such a test by the National Board of Fire Underwriters. I think it removes responsibility from the official, as all he has to do is to sit down and tell them to "show him" anything that is new and that he does not understand. If he comes across a piece of steel construction, that he cannot calculate or figure, he should call on a competent engineer of recognized ability. When he does that, the responsibility is no longer on him but on the man who conducted the test, or the engineer or firm that is responsible for the design. I think too much is expected of the average building inspector, that he is forced to cover a code of regulations so as to become proficient in architecture and engineering.

CONCERNING A UNIVERSAL CODE FOR FACTORY BUILDINGS.

LAWRENCE DAW (Syracuse): I would like to say a few words in relation to Professor Woolson's remarks as to uniformity, as to how the theory would work all over the United States. I believe that it is not possible to prepare a factory building code to be used universally. I will give you our experience with the code we have devised for use in the State of New York, in our jurisdiction. We took the National Board's code for small municipalities and boiled that down and altered it to meet our rating requirements, so that a building which we do not penalize in the insurance rating is permitted by this code. We have found that the greatest objection to the enactment of a new code is in alterations to existing buildings. We have served some 250 of the 560 towns of the State for this purpose, and the question of building code is given as a reason to charge about 10 per cent in the rating of each town. We have found that if we take a skeleton, which Professor Woolson has very aptly given, covering about 12 points that are absolutely for safe construction, we shall have a complete set of rules. We do not go into details, and if they are necessary and vital to any safe construction, the filing of a permit is required for fireproof construction within the fire limits. Height, area, restriction of occupancy, safe construction of walls and their standard thicknesses, roofs and the electrical equipment we consider very important. These things are enumerated and in the smaller villages codes have been adopted and are working out and giving good satisfaction, administered by the chief of the fire department. In the larger cities, we have had occasion to revise the building code. It is used as a framework and all the sections just mentioned are absolutely required and they are enlarged upon to meet the requirements of that particular city. You could not, I think, make one standard code which would apply to every city in the State. But if you take this skeleton and look it over and see where you can better it and obtain improvements it will be an important step in advance. The first speakers spoke of the fact that the building inspectors were not protecting the proper interests. The building inspectors enforce the law just about as much as the people of the town want them to enforce it.

THE CHAIRMAN: I would like to get this clear in my own mind. How small a city would you go into with that, 5,000?

MR. DAW: No, the general village law. A first class village, which is 5,000 population, may enact a building code and appoint an inspector. If they have no special act, it is under special charter.

THE CHAIRMAN: If they adopt or approve a code and provide that the fire chief must issue permits for all new buildings, then you give them a positive code on their classifications?

MR. DAW: Absolutely, and I might add, this code has been adopted by some 12 or 15 villages in the past year.

It is being enforced in the case of new construction.

ARGUMENTS FOR SIMPLICITY AND CLEARNESS.

WALTER F. BALLINGER (Philadelphia): I think the idea of village enforcement does not take care of the places between villages and towns. I think it would be entirely practicable to adopt a code such as has been outlined by Professor Woolson. A number of simple principles and ideas applicable to city and country alike, as a State code, would be advisable, the method of enforcement to be about as follows: A State Building Commissioner, with a deputy commissioner, in each county; the larger cities that already have a department of building inspection to continue as they are, and they may be exempted from reporting to the State inspector or not as you see fit, but the law should apply to the large city as well as to the small place; allow the larger cities which have their own enforcing department to make additional regulations if they see fit. The county inspector, in these days of automobiles, could get around to the various villages of his county and the architect or builder could submit his plans at the county seat to the deputy inspector. In that way the State could afford to employ technically trained men for building inspectors, whereas a village of 5,000 or 10,000 could not afford a competent man for that purpose. I think that would be the solution of it.

A. R. LOVERIDGE (New York): My particular business has brought me into contact with the manufacturer or the property owner, and for the past three years directly in connection with one of the largest manufacturing concerns in the State of New York, a concern which has vast interests in this State and elsewhere. I can say to you from my own experience and observation, that the manufacturer, the man who is the employer of labor, has a keen sense of his responsibility for the safety of his employes. In my work I have never had any difficulty, nor encountered any antagonism, along the lines of the safety of the employe; particularly is that true today in this State and other States under the workmen's compensation acts, which make employers liable for damages arising out of injuries suffered by employes. The question of the uniformity of building laws is one I have considered for some time, and I want to tell you right now that the status of the manufacturer, the property owner, is that he wants to know what he is supposed to do. I am going to take the opportunity to relate to you an experience we had in our plant not very long ago. An inspector from the State Labor Department, who represented our particular territory, came down to our plant and found that we were doing the best that we could to comply with the law with regard to the safety of our employes. Our proposition is not unlike the proposition of a great many manufacturers in the State and elsewhere. We had originally started out in one line of work and something presented itself which seemed profitable and we branched out. And because of our facilities we were required to use the premises we had and we confronted this situation: In a building where we had employed, say, 20 persons on the floor, we were, because of necessity, obliged to employ seventy persons on the floor. The fact that the number of employes on that particular floor was increased 350 per cent was uppermost in the mind of the employer or the owner of the premises and he took all reasonable precaution to safeguard the interests and lives of those employes by providing proper exists, etc. We had, for instance, a stairway, the treads of which we will say, for the sake of argument, were 3 feet wide and on each side of the tread was a little curtain board to keep refuse out and keep things clean and nice, because the nature of our business brings us in contact with other State departments and some of the Federal departments, and we are held up to ridicule if there is any evidence of dirt in our premises. The inspector pointed out to us that the width of the tread was not in accordance with the law. We demon-

strated that there was enough clearance on each side of the tread to permit of two persons passing on the stairway in perfect safety. This man, being of a somewhat higher order of intelligence than some inspectors, saw the force of our argument, and while he never issued any formal approval he took no further notice and we proceeded in the pursuit of our occupation. A feud arose in the department and our particular territory was selected for the purpose of sending out another inspector. It developed subsequently that charges had been preferred against the previously mentioned inspector, and our premises were visited by another inspector who started in somewhat in this manner: He went into our main boiler plant and after looking the situation over, took out a pencil and wrote out a notice and posted it on the wall of our boiler house (the main boiler plant of our entire establishment) that the number of employes was too great. That might have put us out of business. He went into another part of our plant and stated the number of employes to be permitted to be engaged there, thus even though our boiler plant was working, the rest of the plant could not work. He then went to another place and said the number of employes permitted there was 32. We had 68. Then he came up and told us the law on the subject. We said, "Very well, we do not recognize it and do not intend to pay any attention to it. You may go ahead and prosecute us." He went out and after a while he came back and wanted to know what the situation was. We took him over to the place where the notice was posted that 32 could be employed. We had 68, and today we have 69. We told him we were prepared to be locked up and have charges preferred against us for violation of the law and told him to proceed. He did not proceed. Another inspector came along and gave us some regulations and stated the requirements which were in contradiction of those of the latest previous inspector.

The employer is between the devil and the deep, blue sea. And I say to you that the sooner a uniform building law is adopted, the sooner will the National Fire Protection Association be appreciated by the owners and manufacturers of this country, and the more hearty co-operation you will get from them.

IN ORDER TO GET UNIFORMITY THERE MUST BE SIMPLICITY.

L. H. KUNHARDT (Boston): I am glad to see the sense of this meeting, which I think is a reversal of some of the features which this association has advocated as regard building laws. I want to speak especially of the question of uniformity. In order to have uniformity, you have got to have simplicity, and when you have a simple building law, you will only have in it a few fundamentals. It will be a great deal better if we cut out of the building law that this association advocates all details that are in it. They are a handicap to the acceptance of the code by individual communities. I had the problem presented to me in a small city I live in, just outside of Boston. We drew up a building law that I call an automatic building law. I do not think it takes up more than 12 pages of printed matter, small pages at that. It has 60 sections and in those 60 sections are the fundamental requirements for good building construction which would apply to a large community or to a small place, and it would also apply to a farm in the outskirts of a town or city. We specify that there shall be four classes of buildings:

1. Fire-resisting.
2. The mill type with brick walls or concrete.
3. The joisted type.
4. The wooden building with wooden walls, wooden floors, etc.

The next step was to provide that buildings over 2 stories in height should be built in class 4, that is, wooden construction, except that we would allow a roof over the two stories; in other words, a man could build on his property a 2-story dwelling with an attic. The next feature of the proposition was to say that when they build

over 2 stories high, they must build of the next higher class of construction, that is, incombustible walls, class 3. Nothing to prevent them from building class 2 if they wanted to, or class 1, but they must not build of wood when they get over two stories! The next step was to limit the extent of the class 3 construction, and it was provided that they could build all 3 stories and 4 stories in height of class 3 for certain types of buildings, but when it came to tenements, dwellings and other buildings, to go above the 4-story limit, which were classes 1, 2 or 3, they must then step up into class 1, which had the incombustible floor construction. Now, in the class 1 construction, we did not go into a lot of details of window sashes, doors or all of those things, but provided only the essentials in the way of floor materials, etc., and provided for exits at each end. Some of the few fundamental things we put in the ordinance. Another step in the problem was to provide for the spacing of buildings on lots. For instance, we said a man must not build a wooden building within 7½ feet of his lot line. Another man on the other side could not build within 7½ feet of his. That meant 15 feet spacing between wooden buildings. If they wanted to build nearer to the line, they must build in classes 2 or 3. Thus as a man's property became more valuable, he was required automatically to build a better type of building. If he wanted he could build up into the air. Now we come to the farmer. If he wants to build, he must build not over two stories high and if he builds nearer than 7½ feet to his farm line, he must build something else than wood. If that place finally becomes a big town or city, there will be no building in the town but that will live up to the requirements of the building law. You see the whole point of my thought is that this association should not make extreme requirements. Let each individual city or town put in a few more requirements in the building law. When they are added to the building law, nothing therein will conflict with the additional requirements because there is nothing there to change. In other words, take a city where we have allowed them in the past to build 3, 4, 5 and six stories high of wood. You cannot change that condition very well. The buildings are in existence. But if the automatic building law had been enforced before the population had become congested the buildings would not have been in existence, conditions would automatically fit in with the new requirements which would be added. I have made the principle as clear as I can in these few words. In a case like Bridgeport's, if the city would pass a simple building law at this time, in advance of the addition of 10,000 or 12,000 workmen to the population, it would mean that every man who built could do one of two things—he could go into a congested district or out on a farm and build 2-family houses 15 feet apart so long as he wanted to.

MR. MITCHELL (Haverill, Mass.): I heartily believe in a State building law. I have been an inspector of buildings for the past 11 years and any inspector will bear me out, that it is easier to enforce a State law than a city ordinance. A commission was appointed in the State of Massachusetts, some two years ago, to bring in a set of building laws, uniform laws, and we have a member of that commission here. I would like to have the chairman call on him, Professor Killam of Harvard University.

MAKING A CODE FOR MASSACHUSETTS.

PROFESSOR KILLAM: The board consists of two architects and three builders—no politicians, no lawyers. We have a condition in Massachusetts different from other States. We have nearly 100 building laws in different cities and towns. So you see the people are used to the idea of a building law. We also have double and triple building inspections. We have inspections from the district police, we have them in some cases from the board of health; in the metropolitan district we have had inspections from the metropolitan fire prevention commission. As yet nobody has mentioned the waste of energy in inspections, the

waste of time of a man traveling from Worcester, 25 miles away, when a local inspector could do the work better and cheaper. The laws vary in different towns. Builders and architects are not likely to have respect for laws that vary so much. It is a nuisance for an architect to spend his time getting acquainted with all these laws. It is ridiculous for him to have to go to half a dozen persons to get permits. I would have one place to get permits for the whole business. The architect should be able to go to the local building department to get his permit, instead of to the State house, to the fire prevention commissioner, to the board of health or to the local building inspector.

THE CHAIRMAN: Suppose there are no local inspectors?

PROF. KILLAM: We could do as we now have to do, go to the district police. They control certain construction. Waste of energy would be obviated by the formation of new laws. There are good men at work on the new building laws. The work of inspection could be done better by one commission that could get experts to help them. Mr. Forbush is going out tomorrow to see an asphalt shingle plant. It would be better if Mr. Forbush were home inspecting buildings, rather than settling for his city what a shingle is. It would be better for Mr. Forbush, too. That is only an example. We suggest the enforcement of a uniform code, and I agree with everything Professor Woolson says about what should go into a State code. We are suggesting the appointment of a State building commissioner at $7,500 and four deputies at $3,500 each, and we are giving to the State building commissioner large discretionary powers. I do not believe that the code can be as short as Mr. Kunhardt described. I am not at all worried about Mr. Marani's fear that the code will be made so perfect that the architect and engineer will go out of business. It is better to have the essentials in. We have suggested the definition of fire districts. In certain districts you can erect only a certain kind of building. To localities is left what it is essential to leave to them. We have also left to localities the general problems of housing. I think that is a thing in which the layman is interested. We have established a minimum standard up to which every town in the State has to come whether it wants to or not, but we leave the localities free to go beyond that. Many have established the tenement house law. We bring them up to a certain standpoint and they can go as far beyond that as they like. Housing conditions are local matters.

THE CHAIRMAN: You spoke of a State commissioner and four deputies. How many inspectors would there be?

PROF. KILLAM: We have planned at present to take over the 25 inspectors, the number to grow as found necessary.

THE CHAIRMAN: In smaller cities which did not have a separate building inspector, you would do the work directly through State inspectors?

PROF. KILLAM: Yes, but the inspections would apply to assembly buildings.

THE CHAIRMAN: In the small city where building permits are not required by the statute, would you require State building permits?

PROF. KILLAM: For buildings of the assembly type that are particularly dangerous to the neighborhood.

### DISCRETIONARY POWER OF BUILDING DEPARTMENTS.

THE CHAIRMAN: We have to leave this interesting topic. Unless the meeting wishes otherwise, I will leave it so that we may have a little time to give to the other interesting topic, Discretionary Power. For reasons that will appear presently, I shall mention briefly the four types of discretionary power which we found ineffective. We find many cities where the law is laid down in substantial, precise terms and the inspector must enforce it whether he thinks it reasonable or not. We find various boards of appeals in some States. Some of these boards have power to permit variations from the law, practically temporary amend-

ments of the law. Some have no such power, only a power to recognize and pass on new building materials. Some of the laws go a step further in the line of discretionary power. The New York Industrial Board enforces a statute which is specific to a large extent, but gives the board power to go further with discretionary regulations. As I understand it, under a court decision the Industrial Board has been upheld in exercising authority to go farther than the law required. The law required the enclosure of stairways in buildings of 5 stories or more and the Industrial Board required them to be enclosed in buildings of less than 5 stories. Take the case of New Jersey, of which Col. Bryant is practically the building inspector, as far as factories are concerned. He has a broad discretionary power in determining what means of egress are necessary in any given building. Perhaps the extreme bound in this line has been reached in my State, Wisconsin. We have a very general statute which says that all public buildings and all places of employment must be made reasonably safe. Safety includes sanitation and public buildings and places of employment include everything but a private house. The Industrial Board has the power to determine what constitutes safety. Under that law, the Industrial Commission has formulated and adopted without any further legislative action, and is now enforcing a complete building code for the State. That is certainly a very wide exercise of discretionary power. Without arguing the question, I will mention three great advantages which we see in our Wisconsin plan, as follows: In the first place, we are freed from the necessity of acquiring a great deal of technical legal definitions in a building code, which helps us to make the code simpler. We can make it short, because we do not have to take into consideration every possibility which might happen in five or ten years. When the possibility happens, we can take care of it. In the meantime we can make our code shorter. Lastly, most important of all, when we find a special case which the law was not really intended to cover, but can reasonably cover—we can say, legally and openly, without fear of shame, that we will make a special ruling on that case and give the man the reasonable relief he is entitled to. I will leave the topic of Discretionary Power in your hands.

PROFESSOR KILLAM (Harvard University): I hope to hear from Mr. Miller who has been commissioner in New York. I understand he has had the discretionary power here and his experience would be very valuable. It seems to me that discretionary power is absolutely essential, that a long detailed law is a nuisance. If you can leave certain things to a good man who has the power to make regulations on new materials, changed materials, etc., it is a good deal better than tying it all up tight in a code. That is the only fair way to treat the consumer as well as the man who has a new material going into the market, which should be given every fair opportunity to be put on sale at once and not be required to wait for the legislature to act. We shall, of course, immediately encounter opposition from those who are dissatisfied because their particular material is not put into the code, but that is inevitable. The best that one can do in writing these laws is to use the discretionary power idea. In Massachusetts the district police have for years issued regulations without a public hearing and have controlled the important buildings throughout the State, except in Boston. You can appeal to the court, from the rulings of the district police, but you cannot appeal to any board. We have recently established a fire commissioner in Boston who issues regulations without the approval of anybody, so we are particularly apprehensive of giving the power to a man who is not fair. In our bill we are suggesting that such regulations be subject to the approval of the governor. I shall appreciate an opinion from Mr. Miller.

THE SUPERINTENDENTS OF BUILDINGS IN NEW YORK CITY.

R. P. MILLER (New York): In New

York City the superintendens of buildings, of which there are five as you know, the city being divided into five boroughs, each in charge of a superintendent of buildings—the superintendent of buildings has discretionary powers, and I think very properly so. The law itself should provide the fundamentals which are to guide the superintendents. The details of carrying out the provisions of the law must be, I think, largely a matter of judgment, and for that reason the superintendent should have discretion, but I believe there should be some safeguard against the improper use of the discretionary power. We have a rule or provision in the law so far as plumbing work is concerned that furnishes a safeguard in this way, that no plumbing rule can become effective until it has been published for eight successive Mondays in our official paper, the *City Record.* That same principle should be applied to all cases of discretionary power. Where it is necessary for a superintendent to say the provisions of the law shall not be strictly enforced, he ought to be compelled to put his ruling or his interpretation in writing, giving his reasons why he exercises that discretion and publish them. That places a check on the superintendent of buildings against the improper use of that discretionary power—favoring his friends overnight, possibly letting down a rule to help his friend today and reversing his ruling tomorrow, in order to get back to the original condition. I believe, further, that an opportunity should be given to any persons interested to demand a public hearing, so that they might protest against a rule or interpretation that the superintendent intends to put into force. With this arrangement it seems to me we have an opportunity for development. If we try to put into our laws all the detailed requirements, we will hamper development because we do not know today what is coming along next week in the way of new material or new forms of construction. As new forms of construction come along, there will be no specific provision in the law against them. The superintendents, then, if they appear reasonable and proper, can provide for their use under the safeguards that I have mentioned. New development and new material will come in the same as though it were provided for in the law. As a matter of fact, we have found in our experience in New York that it is easy to enforce the rules made under such safeguards, easier than it is to enforce the law itself, for this reason: When we go into court with an offender, either for the collection of a penalty or to cause him to take down improper work or to remedy an unsafe condition, if he comes before the judge and says, "This is the law; the law says I shall do so and so in this particular instance, and I have done all these individual things," and the superintendent cannot dispute it, the court will hold that having complied with the requirements fixed by the law, the man has not offended and is not subject to penalty. The courts assume that when detailed provisions are made for certain construction, that those provisions are intended to cover that construction completely so far as safety is concerned. If, however, the law provides that a building shall be constructed in a certain way, subject to the approval of the superintendent of buildings, that is, if it says a certain purpose shall be accomplished and makes the superintendent of buildings the judge of whether the result is proper or not, the court will always fall back on the judgment of the superintendent and say that is what he is there for. He is the judge of whether the law has been complied with, the court has nothing to do with it. There is no question of interpretation on the part of the court.

THE CHAIRMAN: Would you have the superintendent possess the power simply to make more detailed regulations and recognize new materials, or would you give him a further power?

MR. MILLER: I would give him both. The first is a very important thing and is what I called attention to before as permitting of development in building construction. If the law simply states a certain purpose is to be accom-

plished, that is, if it merely says a wall is to be built so that it will be safe, that it will carry the loads that come on it and will be safe and sufficiently heavy so as to prevent the spread of fire, the superintendents can supplement that by rules laid down saying that under such and such conditions, such and such thicknesses shall be used. That is a matter that should be left out of the law itself and left to the ruling of the superintendent supplementing the law. Then, if at any time it is found desirable to increase those functions for some reason, it will be possible for the superintendent, under the safeguards that I have spoken of, to order the thickness of those walls. There are many cases in which a strict enforcement of a written law would cause hardship. I think we are agreed on that, and for that reason the superintendent should have some power to set aside provisions, and the New York City charter provides for such discretionary power with the superintendent. It provides that a superintendent may modify a law so that the intent of the law is secure and substantial justice is done. It also provides that in such cases he must make a report of that action and the reasons for that action. There is another provision in our New York charter which permits an appeal from the superintendent's action to a board of examiners. This board consists of seven men, one representing a society of iron and steel construction; two others are representatives of a builders' organization, one of whom is to be a mason and one a carpenter, that is, a master mason and a master carpenter; the fourth man is a representative of the New York chapter of the American Institute of Architects, an architect; the fifth is a representative of the New York Board of Fire Underwriters; the sixth represents a real estate organization; the seventh is the fire chief of the city, an *ex-officio* member. The law provides that whenever a superintendent refuses to approve the mode or manner of construction or materials to be used and it can be shown that the laws or the rules do not apply to the case in question, or an equally good and more desirable form of construction is offered, an appeal can be taken to this board. This right of appeal has been very liberally interpreted by our corporation counsel, so that at the present time an appeal can be taken on any point. The board of examiners, as a matter of fact, under the present rulings, has a right practically to set aside any provision of the law. That in my judgment is going too far, and I believe was never intended by the law. The way the law reads is that when the superintendent refuses to approve the mode or manner of construction or materials, then a man can appeal, and only then. The reasons on which he can carry an appeal are in the next two clauses—either he must show that the laws do not apply to his particular case or that he is offering an equally good or more improved form of construction. The effect of that I will illustrate. Our building law provides that in the case of theaters, emergency courts shall be provided on each side of the auditorium. These emergency courts must be at least 10 feet wide for a theater accommodating 1,000 persons or less. They must be 12 feet wide when the seating accommodations are between 1,000 and 1,800, and 14 feet wide when the seating accommodation is over 1,800. Appeals have been taken to this board of examiners seeking to reduce the width of these courts from 10 to 8 feet in the cases of theaters seating only 800 persons and the board of examiners has allowed it on the theory, I suppose, that the 10-foot limitation of 1,000 was fixed at one foot per 100 persons. That action of the board was protested and for the reason (I think a proper reason) that the board could not claim the law did not apply because the law was very specific in saying the minimum width shall be 10 feet. It could not contend it was offering a more desirable form of construction, and even if the first requirement of the charter were a ground for appeal, it seems to me it could not hold because this was neither a mode nor manner of construction, nor was the question of materials involved. Here

was a definite specific requirement and, in my judgment, there should be no appeal on such points. For instance, we fix as the limitation for non-fireproof buildings a height of 75 feet. I do not think any superintendent or any board should have the right to say "You can build 80 feet non-fireproof." There is no particular reason why 75 feet should be fixed as a limit or why it should not be 78 feet or some other figure in that neighborhood, but it is a question of expediency and a question of judgment and the general feeling has been that 75 feet is the proper limit. For this reason everybody should abide by that and no board should have the right to set that provision aside.

MR. PHELPS: This question is of deep interest to me from the fact that in our city of between 50,000 and 60,000, the building inspector has discretionary power to a great extent. For instance, the code provides that he may order anything he may deem necessary in any building, in the matter of egress, halls and a number of things. He may also make such rules anl regulations as he may deem necessary in regard to safety of elevators. The code, therefore, gives the building inspector discretionary power. I think too much power. There is no appeal from his decision except to the courts. I believe that you should give discretionary power with an appeal, but without appeal I believe that it is putting too much on the building inspector and his judgment. You gentlemen know the responsibility that is on the building inspector, for human lives are at stake. The building department in our city is absolutely by itself. The plumbing board and the sanitary inspectors are all under another head. They have some one to fall back on. The building inspector has no one, absolutely, and I believe that this is not right.

FACTORY CONSTRUCTION IN NEW JERSEY.

COL. BRYANT (Labor Commissioner of New Jersey): The jurisdiction of the Department of Labor of New Jersey is confined entirely to factories, places where goods are made or manufactured. It is true that the Department of Labor is a one-man administration under the laws of our State. We, however, have in most cases a minimum requirement which is a great help in the enforcement of the law. We specify that all buildings more than 2 stories in height shall have two means of egress which may be inside stairway or outside fire escapes or both. All buildings more than 2 stories must have an outside fire escape or a tower. The saving clause, however, is always added, "or such other methods or such other additional stairways or additional fire escapes as may be ordered by the commissioner of labor," which, therefore, puts the judgment of the commissioner of labor as the final court of appeal. Under the operation of our law, plans of factory buildings must be approved by the commissioner of labor before they can be built. We go into the questions simply of egress, that is the location of the egress, the character of the egress, the location of the toilets and the ventilation of the factory. We do not go into construction, that is all left to the local authorities. This joint administration, so far as factory buildings is concerned, has worked out admirably in all the larger cities where they have a well organized building department. The plans are passed, therefore, by the local building department and sent to the department of labor. When approved by the department of labor, they go to the local building department because there is no conflict of jurisdiction, if the egresses in the building are to be constructed in accordance with the laws of the State and as laid down by the department of labor. The general construction of the building is supplemented by the local building ordinance. The same is true as to closets and sanitation. We pass on the location of the toilets, the approaches, vestibule, the outside ventilation and the number of toilets provided, but the plumbing code is specific and is controlled by the local authorities. For example, in stair enclosures, if they specify that the stairs shall be of either fireproof or fire-resistive material they shall be enclosed,

a very wide discretionary power is left to the commissioner of labor. It is, however, working out very satisfactorily with us because we can call for a character of construction which would seem to be required owing to the occupancy of the building, the location of the operatives, the character of the manufacture which is to be maintained there and also the sex of the operatives.

MR. OAKLAND: I would like to ask about public hearings, how they can be handled?

MR. MILLER: Well, I would have the hearing before the superintendent or the building official. In framing our rules in New York we have given public hearings, but not as advertised public hearings. When, for instance, we drafted rules on construction, we sent out as widely as we could to all persons who were interested in reinforced concrete a notice that we had these rules under contemplation, and we had a draft ready, copies of which were sent, and they were asked to consider the preliminary draft and come to the office of the superintendent, at a certain time, prepared to discuss the preliminary draft. There was always a response and there was a friendly discussion; only those who were interested in that particular subject being there, we did not get in any extraneous criticism or unnecessary or irrelevant criticism; but we got suggestions for improvements or objections to what was proposed. Then, based on the criticisms and suggestions, a second draft was prepared. The second draft went through the same treatment. Very few points were raised after that. A few changes were made and the final draft sent out. That was done voluntarily. There is now no legal requirement that that should be done, but we felt that it was due to the public and to those who were interested in the subject that they should have an opportunity to express their views. The superintendent should not be able to sit back and of his own accord say what should be done. In that way we have done what I am now urging as a thing that should be done. The superintendent should be given the power to make rulings supplementing the general provisions of the law. We have obtained very excellent results in our elevator regulations, in that way. They are acceptable to everybody and they were drafted in that way.

S. A. DIES (Pittsburgh): I heartily approve the sentiments of Mr. Miller. I do not think any building inspector should be clothed with too much discretionary power. About the only discretionary power that we have in our building code is in the matter of party walls, in which the building inspector's or the superintendent of the bureau's decision is binding. It does not make any difference how fair a man wants to be, he will probably be accused of not being fair. Therefore, while some of us may have understood that he is in favor of discretionary power, I think that Mr. Miller's ideas are fine. I do not think any building inspector should be clothed with final powers.

## BURNING OF ICE HOUSES.

Commenting on the burning of ice houses in Newton, Mass., following similar fire losses in Providence and Lexington, the Boston *Herald* said:

Apparently an ice house is as safe against fire as a pump log or a mud scow; yet give the flames but half a chance and nine times in ten they work a total loss. Under ordinary conditions an ice house fire starts easily. The walls rise without masonry direct from the ground; grass fires and brush fires creep into contact with the bare wood. Dry straw and hay lie all about. Damp sawdust within often takes fire of itself. Tramps, never over-careful in their smoking, seek shelter in the buildings. The sawtooth roofs could not be better planned to catch sparks from passing trains. And when the fire has started, it is uncommonly hard to master. In most cases it gets an overpowering headway before the fighters can assemble. Hydrants are often lacking. If the buildings are full of ice and the covering straw, the firemen can work only from the outside; if the buildings are empty, the great spaces give the flames both draught and sweep. And the walls, by their peculiar construction, double or triple with twelve or eighteen-inch spaces between, packed with tan bark or other combustible filling, usually baffle all attempts at reaching and extinguishing the well-fed fire within them. The ice houses that burned in Newton had been on fire five or six times before.

# *Private Fire Supplies From Public Mains*

*Committee Report and Round Table Discussion at the Nineteenth Annual Meeting of the National Fire Protection Association.*

PRIVATE Fire Supplies from Public Mains with Special Reference to Automatic Sprinkler Connection to High Pressure Fire Service Systems was the subject of a Round Table Discussion by the National Fire Protection Association, at the meeting at the Hotel Astor, New York, on May 13, following a report by the Committee on High Pressure Fire Service Systems. George W. Booth, of New York, presented Chairman Machen's report for the committee.

MR. BOOTH: During the past year the members of the committee resident in New York City have had a number of conferences. Two meetings were held with Mr. Morris, who represents the committee in Philadelphia. In February the chairman of the committee made a trip to Boston in order to take up with Mr. French of the Committee on Private Fire Supplies questions where the work of the two committees might overlap. At a meeting in New York in the early part of April, at which were present Messrs. Booth, Morris and Machen of the committee, it was decided that a progress report should be prepared that could be adopted without too much discussion, giving briefly the pros and cons of the situation as developed to date, but without making definite recommendations for the present, inasmuch as the designs, etc., of the high pressure fire service systems and of the fire insurance interests were not yet definite enough to be summed up into a series of recommendations. A draft of the proposed report was prepared. An examination of the report prepared by Mr. French on April 10* showed that it covered practically the same ground, and that the proposed report of the Committee on High Pressure Fire Service Systems would be a duplication, taking up the valuable time of the meeting needlessly. Briefly, the general ideas as collected by

*The views expressed by Mr. French were given in a letter to Franklin H. Wentworth, secretary of the National Fire Protection Association, under date of April 10, 1915:

Dear Mr. Wentworth:

In our recent discussion on this subject and allied questions in connection with the committee on High Pressure Fire Service Systems I promised to write you in a somewhat general way stating how the whole problem appears to me today and you proposed to send this to our Private Fire Supplies committee and, perhaps, to others interested, in order that the whole subject might be discussed at the coming meeting of the N. F. P. A. I would start with the proposition that all experience shows, with increasing evidence, that the automatic sprinkler is by far the best piece of apparatus in existence for the control of fire waste. This proposition hardly needs arguing today and I assume would be accepted very generally.

With this as a starting point it follows that every encouragement should be given to increase the use of automatic sprinklers. A primary inducement to owners is that they can obtain the necessary water supply readily and at moderate expense. Excessive restrictions in the use of public water systems or the necessity for large elevated tanks or expensive supplies of other kinds discourage the increase of sprinkler equipments.

On the other hand connections for sprinkler supply must be made and used under such conditions that they will not endanger the safety of public water systems, for conditions will arise when fires will escape from reasonable bounds and the heavy artillery of fire streams, though clumsy and inefficient, will be our only means of defence.

Some years ago our Committee on Private Fire Supplies reported fully on the value of sprinklers and upon various methods for controlling fire service connections. We gave arguments as to the size of connections which should be permitted and offered some ideas for standard methods of handling such. There has been nothing in the years since to change the general ideas then expressed or the conclusions then reached. This will all be found in the printed proceedings of the N. F. P. A.

The vital points in the ordinary fire service connections are, first, that they shall be of such size as to insure the sprinkler system to which they are the primary source of water an ample water supply to meet any conditions. If the supply is limited the value of the sprinkler equipment is reduced. The old idea that nearly the whole value of sprinklers is through the first few heads which open has been changed by accumulating experience which shows that with ample water sprinklers may do a larger work and they have repeatedly stopped severe exposure fires. It is desirable that this greater ability inherent in good sprinkler systems should be understood and made available wherever the need for it may arise.

The second vital point is that service connections for sprinklers must be capable of control from the outside and handled under such intelligent conditions that when now and then fires for any cause escape from narrow limits and pipes become broken, water may be shut off, bleeding of the system prevented, and its whole capacity made available at other points and for other uses.

I have believed that a standard method of outside control could be developed for cities. We already have it for the larger manufacturing plants in which

the committee on high pressure fire service systems are:

1. That the sprinkler system is the most efficient means of directing water on a fire in its early stages in a sufficient quantity for control.

2. That connection to the high pressure system is the most economical means of obtaining an adequate water supply at a suitable pressure.

3. That at the present time, under the controlling conditions, it is not possible to compel the installation of sprinkler systems throughout any given district in the city.

4. That a conflagration might be started in buildings not sprinklered which the sprinklered buildings could not retard.

5. That the present practice of the fire departments of having the first company responding to the alarm connect up with the nearest high pressure hydrant, and so secure an ample supply to the sprinkler, is a step in the right direction and possibly as far as should be gone until the universal use of sprinklers in the danger zone is compulsory.

6. That the question of pressure-regulating devices, shut-off valves and

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there is yard room and an opportunity for indicator posts and easy access to them. In the cities a post of such standard design, rugged in construction, could be developed. Where such an indicator post was not feasible a valve in the ground with a standard form of sign showing its location could be developed.

With these ideas worked out it would in a rather short time come to be generally understood by fire departments and others having any responsibility in these matters, that this standard type of control existed and the indicator posts or signs would be recognized as readily and understood as clearly as the red fire alarm box is today.

It is true in our crowded cities there would be question as to the accessibility of controlling valves in times of severe fire. The needs of each case ought to be somewhat studied. I believe, however, that generally such controlling valves could be so located that they would be accessible under most conditions. For bad buildings connections might have to be looped back or valves carried somewhat away from the immediate vicinity of the buildings and placed where they would be somewhat sheltered.

With these points worked out it would be necessary to develop in our fire departments a squad of men under proper officers to handle such valves. We cannot expect to have elaborate equipment without providing the intelligence and the organization to handlle it. The men of these squads should understand the value of automatic sprinklers and they should know the arrangement of piping throughout the districts under their charge and be provided with such plans as necessary.

With such equipment and such method of using it intelligently there would be little danger of a public water system being bled dangerously. Trouble from conflict in the handling of valves would be avoided and in a reasonable time experience would accumulate until the automatic sprinkler equipments would be used and controlled as intelligently as are the other parts of the fire fighting equipment in our better departments.

This leads naturally from the question of connections to our ordinary waterworks systems for automatic sprinklers to the possible use of special high pressure fire systems such as a number of our larger cities now have. In these enormous volumes of water are available at pressures running up to 300 lbs. These systems have, I think, so far been used exclusively for hose stream work although possibly hose lines may be carried to sprinkler systems. Such systems furnish the extra heavy artillery with which to smash up and drown a dangerous fire. The use of these for sprinkler supplies has, I think, been generally looked upon as inadvisable.

I have had a feeling that the very large expense entailed by such special fire service systems ought, if possible, to bring even greater benefits. I have been inclined to feel that these systems could be used safely as a supply to sprinklers. If this could be done and the ordinary service also used, making two independent systems available, a large cost on owners for tanks or pumps, etc., would be avoided and a material encouragement given to the larger use of sprinklers. This would mean a materially larger use of the expensive high pressure systems and consequently a greater return for the money expended.

The method of working out such a use would need further study. But if the sprinkler equipments are the most efficient means of controlling fires then it follows that it would be a decided gain if these expensive high pressure water systems could be made available for increasing the efficiency of sprinklers and to encourage the extension of their use.

A first difficulty is the high pressure which has been considered desirable for these systems. It is probable that the maximum pressure may be somewhat reduced over those which have been provided for in some cases and that in all new sprinkler work there would be little difficulty in providing sufficient strength in pipe, fittings, and sprinkler heads to withstand safely any pressure ever really needed on the high service systems. For the older equipments reducing valves or other means of utilizing the high pressure water can probably be developed. The question of the danger of bleeding these supplies will be lessened by methods of control along the lines suggested above, which could undoubtedly be developed to take care of this feature.

This suggestion, which I want to make with the clear understanding that the development of it would need considerable further study, is based on the idea of very materially increasing the use of these systems which are provided at so large an expense. If encouragement and requirements could bring under sprinkler protection the danger spots in our cities the conflagration hazard could be practically eliminated. I have often wondered if the enormous expense for high pressure systems and great fire departments would not, in reasonable time, produce better results if put into sprinkler work, coupled with reasonable requirements as to construction and fire cut-offs at danger points. I do not of course mean to suggest the elimination of all high pressure systems or of fire departments, but rather raise the question whether more direct treatment of the danger at its source would not make the high cost high pressure special fire system unnecessary in most cases and permit in many a very material reduction in the cost of public fire departments.

Some of these ideas may seem radical and I should consider them subject to much modification on further study. I present them, however, as points for discussion. It has seemed to me for some time that a number of fire protection engineers interested in the safety of cities and large communities of any kind could to advantage work along these general lines and I have believed some standard method of arrangement of service, design, and use of controlling devices, and development of methods of operation would result in a distinct advance in the common practices and standards in these matters. What is often needed is for some few men to work out the details, show the way, and the general adoption of the larger ideas then comes along with only the need of reasonable encouragement.

I have not had time to work these ideas out more fully but send them along in this shape as a starting point and in the hope that they may be of some service in the general cause.

Yours very truly, E. V. FRENCH, Chairman.

other details can be quickly solved, if the decision is made to allow direct connection between the independent fire main and the sprinkler system.

7. That the danger of bleeding the high pressure mains by broken connections at the time of a conflagration is not something that can be passed over by stating that with an ample supply to sprinklers there will be no conflagration.

8. That we cannot rely on the shutting off of large connections in times of emergency to prevent bleeding. The Coney Island fire of some years ago showed that selfish interests can bleed a system. The Salem fire of last year showed that physical inability to shut off valves had the same effect.

9. That the independent high pressure fire systems, both distribution and pumping stations, were built at great expense to the taxpayers; anything which permits a greater return in service is justifiable unless it seriously interferes with the purposes for which they were constructed.

10. That opinion today is divided on fairly definite lines. Fire department officials, water works designing and operating engineers and a number of fire insurance engineers, looking at the subject from the operating point of view, nearly all agree that for the present it is inadvisable to permit direct connections between independent fire mains and the sprinkler systems. On the other side, the belief is that it is only a question of design and suitable details that stands in the way of a more extensive use of the high pressure mains, covering not only the supply of water to the fire mains, but also an adequate and inexpensive supply of all sprinkler equipment. On this side are a number of able insurance men, men whose position is such in the engineer's field, as well as in the insurance world, that their opinion carries very great weight. Their ideas on the subject are entitled to thorough investigation before a decision can be reached.

E. V. FRENCH (Boston): The chief point is that cities throughout the country are putting in more or less expensive high pressure fire systems. I think we all agree that there is nothing more uncertain than an erratic hose stream. However, this condition is not necessary, nor is it scientific. In many cases it lets a fire get a long way from its stream before it is controlled. We all know from long experience that there is no way of putting out a fire with water as efficiently and as absolutely certain as the automatic sprinkler. As fire protection engineers, the thing for us to do is to work toward the more efficient methods as rapidly as possible. Although our cities have spent a great deal of money for high pressure systems they have obtained nothing so far but a hose stream equipment, possibly supplemented by the carrying of a hose stream to standpipes or connections. If it is possible by good engineering and ingenuity to go farther and make the high pressure systems of a larger use, then we shall have taken another distinct step in controlling the fire waste. I think the matter has been well put in the report which Mr. Booth has given us, but there is a good deal that is still in the process of evolution. I want to see if we cannot make clearer the value of sprinklers to the high pressure systems, and consequently the advantage of making, if possible, the high pressure system an encouragement to the use of the automatic sprinkler. It is a mark of barbarism to see in our cities the skyline of buildings studded with tanks. We have had discussions at times on the subject of these structures and the methods for dispensing with them. We are spending hundreds of thousands of dollars and more to get fine water supplies. If we can make those water supplies do their largest work, we shall get rid of a very large cost in tank work, in installation and in maintenance, and we shall get what is of greater importance—a larger water supply available for the sprinklers so that the high pressure system can be carried along, thereby furnishing heavy artillery for the big fires, which for many years we were letting get away from us. At the same time it can furnish water for sprinklers of ample quantity and proper pressure. We shall then do a great deal toward encouraging sprinkler protection. My plea is not to go against the

judgment of men who are fighting fires daily in our cities but to see if, as good engineers, we can evolve something which will carry these systems to a larger use and mark another definite step in the fight against the enormous fire waste. Many of us believe that can be done. If, in our cities where this matter has been somewhat worked out, where careful thought and detailed study and painstaking work are given to it, we shall find that further step to be possible, the taxpayer will get a larger return for the amount of money he is putting into these things, and the fire waste will receive another hard blow. I think these are the main points, which can be supplemented by details if necessary.

RICHARD H. MORRIS (Philadelphia): I am a member of the committee in Philadelphia, appointed by the mayor, to see if this question could not be solved in our city. We have gone along and have solved two or three problems which have heretofore seemed to be barriers, but instead of telling what we have done, I would like to hear what others have to say for the benefit of our deliberations in the future.

G. M. ROBERTSON (San Francisco): I do not wish to take up the general subject. I merely want to speak of things that are actually in existence at the present time. We have on the Pacific Coast a number of sprinkler systems which are connected with systems giving from 150 to 200 pounds pressure. We are never afraid of too much pressure, we are afraid of too little. The total mileage of high pressure in San Francisco is 72; added to this is 10 miles of high pressure pipe in the exposition grounds. The engineer, Mr. Johnson, has not been afraid to connect the local connections to the high pressure system —no control of any kind except a valve. The sprinklers in the exposition buildings number 36,627. They are controlled by 224 valves, and they are fed by various 4-inch pipes, 8-inch pipes, etc. There is a daily leakage in the entire 10 miles of from 2,000 to 3,000 gallons of water. There is a total leakage in the entire 72 miles of pipe in the city, added to the 10 miles of pipe in the exposition grounds, of less than 100,000 gallons. I venture to say that no other pressure system can show as little leakage as that. The high pressure system in San Francisco is controlled in this manner: The highest source of supply is elevated, it is about 750 feet above the base of datum level—of course that pressure is too high to be admitted generally to high pressure system; it is controlled by two subsidiary reservoirs, one with 500,000 gallons and one with 750,000 gallons; they divide the city into zones, the lower zone having at no time more than 150 pounds of pressure; the other gives a pressure of 215 pounds per square inch; this pressure of 215 pounds is the one that is generally embraced by the system in the exposition buildings. They have all been tested for one hour and I, myself, witnessed the test. Only one head has been knocked off by a ladder. At the same time I conducted two fire tests—it was quite a big fire and the nearest sprinkler was 40 feet above it. The lowest vertical pipe in any of the buildings was 40 feet. The sprinkler opened in about 3 minutes or less, and it was a remarkable exhibition. The fire went right down; it was squelched in one minute. A point peculiar in San Francisco at present is that when bonds were called for money to install this system, they were promised sprinkler connections. The city engineer's office prepared an ordinance allowing sprinkler connection with the high pressure system. The chief of the fire department is timid about this particular thing. He views with alarm the fact that there may be a number of broken mains or connections and the water would get away. Of course, we have a cause for broken connections but that does not occur once in about 40 years, and we are willing to take that chance. If we put out a number of fires within the next 40 years, we shall consider that it has paid. I do not see how people can refrain from doing this good thing. Mr. Booth just now said you could not count upon the valves being turned off. We had an experience which will illustrate this point. In one of our main streets, in the shopping and theater districts, there was a block being excavated alongside the main and no precaution had been taken to hold the

main in place, and it broke and a stream of 115 pounds shot out into the street and wasted about 100,000 gallons in about 15 minutes, but it was controlled almost immediately. The man who is on duty at one of the subsidiary tanks saw the water begin to drop, and he immediately shut off the water and telephoned to the flying squad that has control of this branch of the work. We learned our lesson, and thereafter when we excavated alongside of a pipe we either supported it or cut off the supply temporarily. There is no reason why they cannot supply the proper cutouts at the present time.

MR. GUERIN (New York): The matter of connection of sprinklers with high pressure systems was taken under consideration by the fire chief of the New York fire department some 18 months ago, in connection with the completion of the aqueduct. He came to the conclusion that it would not be right to waste that pressure, laying dead in the pipe, whereas it might be suitable for the sprinkler systems in building of 44 stories or so. The Merchants' Association of New York City has made it a rule, and will insist upon it, that the high pressure be available for sprinkler supplies just as soon as the aqueduct work is completed.

H. B. MACHEN (New York): What Chief Guerin says is in direct contradiction to the idea I gained from Fire Chief Kenlon when I took lunch with him last week. About a week ago I took up with Chief Kenlon the question of direct connection between high pressure fire systems, particularly referring to the system in New York, the construction of which I had charge of. I asked him whether the fire department was inclined towards a direct connection through pipes or whether it would be more favorably inclined to putting the control of the connection in the hands of the fire department by a regulation calling for the first company responding to a fire connecting up to the outside connections of the sprinkler system. That was the idea I gathered from him, and I incorporated it in the report of the committee. Looking at the subject from the operating side of the water department, direct connections with the high pressure system are inadvisable. Mr. Robertson stated the small amount of leakage they have in San Francisco. We have a great deal more. We have 700 gallons a minute leakage or stealing. Three or four months ago the meter readings on the high pressure system, definitely at six o'clock, jumped 50 gallons at night, and in the morning dropped as promptly at a specific hour. That was somebody who had a connection. We have located in our 128 miles about 10 connections that were made without permission to the high pressure mains. There is a temptation for the property owner to connect his pipe system with the high pressure and get as much water out of it as he can, and unless the insurance people are willing to aid the city authorities in collecting back penalties, I cannot see why we should permit it.

MR. GUERIN: I have been misunderstood by the speaker. I did not mean to intimate that Fire Chief Kenlon favored connecting sprinklers to the high pressure system as it is at present; but when the aqueduct is completed, and the pressure established, he believes it should be done, provided adequate devices are supplied.

MR. BOOTH: Perhaps there is still a little misunderstanding. There is a proposition here in New York to raise the pressure on the Croton system, either by using the Catskill supply or by pumping. I believe that Chief Kenlon's idea is that when that is done, connections to sprinkler equipments can be made to the domestic system rather than to the mains of the high pressure system, that the pressure will be great enough to provide for sprinkler equipments in quite high buildings. I think it will not be as easy as Mr. Robertson has intimated to provide adequate safeguards to cut off the flow through broken connections. I do not want to be quoted as feeling that it is not possible to safely guard this matter, but I do not think any provisions yet made have gone far enough in that direction.

C. L. SCOFIELD (Montreal): I make the motion that the National Fire Protection Association puts itself on record

as favoring connections from high pressure systems to automatic sprinklers, and that we write into our records just what is meant by high pressure systems, whether to be applied solely to a pumping system or a gravity system.

MR. ROBERTSON: Seconded.

MR. FORSTER: I think I am partly responsible for this discussion today. I want to say as forcefully as I can that this is not at all a question of engineering, as far as I can see it, but primarily or altogether a question of education of the people who have control of the water supplies with which we wish to connect. We have, from Boston to San Francisco, high pressure services to which sprinklers are connected. If any city authorities will say to the fire prevention fraternity in that city: "We approve of the general scheme, how can we get together on the details?" we will jump at the opportunity and no doubt the whole thing can be settled in about 60 days. What we have to do, after 10 years of discussion among ourselves and the general approval of the principle, is to work on the men who have control of the water supplies. It was hard work getting sprinklers on to the low pressure systems in many cities, in the first place; but today there are very few cities left where you cannot get sprinkler supplies with or without charge on the low pressure, and the high pressure is the next step forward. As to the question of bleeding from high pressure systems—there are two ways in which bleeding may take place. Breakage at times other than fire, which problem is one that can be controlled. It is true that a high pressure break is more destructive than a low pressure one, but we have flooded blocks by having a 30-pound main burst. The higher the pressure the better the engineering. I do not think that the break of a sprinkler system at a time other than fire jeopardizes a city. Take the other point into consideration, the bleeding caused by opening up of many sprinklers at the time of a fire. When there is a fire in the building, the best way is to use the water available to prevent the fire sweeping through the building and sprinklers have frequently shown their inability to cope with this. It might be well to use part of it for means of defense against such expanding of fire, and I cannot see, after thinking about this and reading about it, that the break is going to jeopardize fire safety from the hose stream point of view.

MR. MACHEN: I do not think the education is all needed in the water departments. We have a larger field to attack. We have to attack the public, the people who are going to use the water, and until they are educated up to the point of not stealing our water, which we are pumping at a considerable expense, connections are impossible. We have to fix it so that at the time of a fire, if we pump out our entire capacity of 30,000 gallons a minute, that we are not going to put a large part of that into private property, but that it will be available for the fire department, and for the fire department only. There is no question in my mind, from an operating point of view, that the stealing of water will be extensive.

A SPEAKER: The man who is stealing water from the public service main can be very easily gotten around. The use of a meter will give the water department an absolute indication that water has been taken out of that system as much as any domestic water system will show.

MR. BROCKWELL: The low pressure system is a step toward encouraging the use of the automatic sprinkler. This discussion has got to the point of stealing water. I would like to say that in every city where you have a high pressure system you will also have a plumbing inspector. Leave it to the plumbing inspector and the police department.

MR. MORRIS: It is advisable to get city authorities, the fire department, to agree to a reduction of the maximum pressure of 250 or 300 pounds, which seems to be the average. In Philadelphia we have attempted to control the pressure by a reducing valve without appreciable waste of water. Sufficient progress has been made to show that it is perfectly feasible, so the point is not to put 250 or 300 pounds' pressure in the system, but to control it so that you will never get over 150 or 200 pounds.

H. A. FISKE: This problem is such an important one that we must look at it from a broad viewpoint. There are a few facts that we cannot get away from. The automatic sprinkler is a device that is generally installed. The reason the sprinklers are not even more generally installed is the difficulty in getting a good water supply at reasonable expense. We hear in many large cities that they are planning an excellent water supply for sprinklers. With that water supply at hand, sprinklers can be put in all our buildings and give us the protection we are all after and have been seeking for years. We must not let anything interfere with this progress.

MR. FRENCH: I think the remarks made about stealing are pertinent. I know the troubles Mr. Machen has had, but what they mean is that there are a lot of details to work out, and I am sure the ingenuity of the engineers and water supply men will be sufficient to work this problem out, and that the law will take care of stealing. The other question of bleeding is important because high pressure systems must, under certain conditions, be used as heavy artillery and they must be complete—but that is another thing that requires careful thought to be properly handled. It just means a proper controlling by valves. One thing has not been reached yet. If we have all this big equipment, we must provide a means to handle it in emergencies. We have all sorts of firemen who ride around in red wagons, but we ought to have a squad of intelligent men who know where every valve is, and who know the theory and practice of fire fighting and sprinklers, and who will go to all fires just as the fire engine does, and, when they get there, exercise control over the water supply to prevent waste. That control should always come early in the fire, not be deferred until the burning of several blocks. Right there is a place for study, for ideas of what can be done, how we can do it, etc. As to pressures, it is a question whether the high pressure for the hose stream can be brought to meet the strength of the sprinkler system. Some kind of reducing valves will have to be made, but that is another point that can be worked out with reasonable thought. Another thought—where are we to get our other supply if we depend on our high pressure service without the primary supply. Here is a point: Have you, with your high pressure service, a supply from a domestic service? In some cities the domestic service will be a reasonably good secondary supply. If that cannot be, then make your two public water supplies absolutely satisfactory supplies for sprinklers. There is a growing sentiment for the high pressure service, and, without doubt, the problems are capable of solution when we make up our mind that solution is the only thing that we need.

## INSTRUCTIVE PICTURES.

The German American Insurance Company of New York has published in book form drawings by C. C. Dominge of the schedule department of the company which illustrate in a graphic way, most plainly and forcefully, various fire dangers which are the basis of underwriters' charges. Mr. Dominge's work is original and introduces something new. Insurance brokers and property owners can learn more in a minute from Mr. Dominge's sketches than they can learn in a year by reading the dry-as-dust underwriters' schedules. The German American has done a fine thing for itself in issuing this book. It is to be assumed that Mr. Dominge's facile pencil has made only a beginning and that more of the underwriters' standards are to be interpreted in a similar manner.

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The fire waste is the greatest of our national waste. It is impoverishing our people. They must be aroused to this fact. The work to be done is to bring them to realize it.—*H. L. Simpson.*

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When the people understand that the loss by fire is a waste, then they will desire to know how to stop it.—*H. L. Simpson.*

# EDITORIAL

**We Must Reach the Youth.**

IT is a serious question, in the education of the public as to the avoidance of danger, whether we are not making a mistake in directing practically all of our efforts on the older citizens, whose habits and ideas are fixed generally and ignoring to a large extent the growing, impressionable child.

Ideals inculcated while the mind is receptive are the most lasting. As boys, we made heroes of the men who were the most daring and reckless, and that ideal has been retained after growth into manhood. The brakeman who swung on the fast moving train was worshipped and envied, while the careful man was only tolerated, if he was thought of at all. As boys, we all longed to do as the daring one did.

The life of the average young man, say from 16 to 20 years of age, under existing conditions, teaches him that the man who will not dare danger is a coward and worthy of nothing but the contempt of his associates. Rowdyism practiced by youths is nothing more than an effort to do something that will be considered brave and daring, something that will be really worthy of the approbation of their companions.

While not abating one degree of the work now being done to educate the grown-ups in safety first, it would be wise to devote some of our surplus energy toward educating the rising generation, and, if we do, our future work will be so much easier.

The boy scouts' organization affords a channel through which the right thoughts and principles of caution and safety might be spread. If that organization would take up this question aggressively, we would be able to reach a large number of our most intelligent, growing boys, and it would open an opportunity for that organization to become a still greater factor in the making of useful citizens.

Let one of the fundamental thoughts, impressed upon these boys, be that recklessness is not courage, but simply a cheap bid for popular approval, worthy of no one except an egotist.

SAFETY ENGINEERING would like to see the time hastened for the subject of safety to be taught in our public schools, emphasizing again the fundamental that, if the child is taught to be careful, to look out for itself and for everybody else in the vicinity, there will be little or no need for organized safety committees in our shops and factories in the future as every workman, trained from childhood, will be a safety committee of one.

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**Destructive Economy.**

AN idea seems prevalent among employers of labor that, due to the somewhat abnormal conditions produced by the business depression which has been in evidence during several months past, the curtailment of expenses in all departments should be the order of the day; in other words, that economy more than ever is the necessary key word.

The elimination of unnecessary expenses should be, and is, a fixed policy in most industrial enterprises, but the question as to what is unnecessary expenses

is often a hard one to decide; that is, whether the policy adopted is constructive or destructive.

It is noticed that some manufacturers are using the depressed business conditions as an argument for the abolishment or the curtailment of their activities along accident prevention lines. Whether this policy is wise is certainly open to serious question.

It is taken for granted that the existing, abnormal conditions are of a temporary character only. Men high in the financial and industrial world prophesy confidently that this country is on the eve of one of its greatest eras of activity ever experienced. If such be the case, and all indications are in that direction, the logical position for the manufacturer to take would be now, while business is somewhat slack, to safeguard his equipment properly and to exert an effort to educate the workmen who have been retained, developing among them that esprit de corps so necessary in an accident prevention campaign when the plant is running at 100 per cent. capacity. Any retarding of the efforts in a plant in the movement toward greater safety on the plea of saving, cannot be termed anything less than destructive economy, which ultimately will reflect itself in greater cost of compensation insurance.

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**Accident Prevention as an Investment.**

ACCIDENT prevention is a paying investment, according to statements by officials of the United States Steel Corporation. Approximately $5,000,000 has been expended during the last eight years by the subsidiaries of the corporation in the installation of safety devices and the adoption of accident prevention measures. Naturally the question arises, What, if any, results are apparent from this tremendous investment?

Reviewing their experience over three years, we find that 6,308 less serious accidents were reported from the several plants than would have been the case had the ratio of the preceding years been maintained. That in itself, to say the least, is a gratifying result from a humanitarian standpoint, but coming down to a real dollar-and-cent basis, which must be adopted in the final analysis, we find that the saving effected in casualty insurance in the three years in question was $4,775,693; or, subtracting the cost of the accident prevention measures for the three years, which was, according to their figures, $2,371,200, the net saving was $2,771,981.

When we consider, in connection with this exhibt, that the payment per man injured was increased materially during the period, the inevitable conclusion is, as the most skeptical must admit, that safety pays.

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**Infection of Wounds.**

IN an article on "The Prevention of Infection," Dr. Thomas Darlington, C. E., of New York, cites the large number of deformities of fingers and hands due to the infection of wounds, and says: "Case after case is on record where such poisoning has resulted in necrosis of bone and made necessary its removal; or tendons have been divested of their sheaths and become fastened to the tissues and will no longer function; or an abscess has destroyed the muscle itself; or nerves have been ruined, causing paralysis; and hands become deformed, twisted and useless. Thousands of dollars in compensation have been lost and men incapacitated needlessly."

# *Outside Stairs and Exit Capacity for Safety to Life*

THE REPORT of the Committee on Safety to Life at the meeting of the National Fire Protection Association was submitted by Chairman H. W. Forster, of Philadelphia. The Specifications for Outside Stairs were printed in pamphlet form for consideration by members who might desire to submit suggestions. Lantern slides of drawings illustrated the points made in the specifications.

It was obvious that a number of changes in the report would be necessary. Area of window protection, use of wing walls and similar items were discussed to a considerable extent, and the Executive Committee was empowered to receive a modified report from the committee and pass on its recommendations. A part of the report on Number of Occupants Based on Exit Capacity was read by Mr. Forster.*

Stenographic report of Mr. Forster's remarks:

H. W. FORSTER: Your committee presents herewith its second annual report. During the past year the committee has done chiefly the following:

1. Continued its work on outside stair specifications, and it will present today what is hoped will be a final report.

2. Prepared a report on Number of Occupants Based on Exit Capacity. This report will be read today.

3. Arranged for, and assisted in, a conference on possible revisions of the National Electrical Code to harmonize it with the accident prevention point of view. In this connection it may be mentioned that the Bureau of Standards has in hand the preparation of what it is hoped will be the National Electric Safety Code, and which will be a companion work to our world-renowned fire code.

4. Conferred with and given advice to a number of our association's committees.

5. Kept in close touch with the safety movement throughout the land, with special reference to items of interest from both the fire and accident prevention standpoints. As President Campbell of the National Safety Council is on this committee, and your chairman is on the executive committee of the National Safety Council, it follows that our two sister associations are working together in entire harmony.

Our membership will be glad to know that the National Safety Council has been growing at a splendid rate, having now well over one thousand members, representative of all sections of the country, extending to almost every industry, and including in its membership, as in our own association, the ablest men in this line of activity.

We propose to read our report on Number of Occupants Based on Exit Capacity, which, as the members will observe, is a presentation of the essential factors in this problem, and which we hope will be a valuable guide, and follow this by our report on Outside Stairs, illustrated with lantern slides to facilitate discussion.

NUMBER OF OCCUPANTS BASED ON EXIT CAPACITY.—Your Committee on Safety to Life believes that the following brief treatise on number of occupants as determined by exit capacity may prove a timely contribution and that it may afford a basis for discussion and a source of information for a number of interests, chiefly the authorities upon whom rest the drafting of the building codes and factory laws.

It is now being recognized that the number of persons who may occupy a given building should be based on the available exit facilities, and certainly that new buildings should be constructed in conformity with definite schedules of exits required for the proposed number of occupants. It seems rather strange that it is only recently that this point of view has become fairly common. The

*The accompanying illustrations of fire escape conditions emphasize the report of the committee.

human contents should be measured to the available exits, just as the material and equipment which may be placed in a building are limited by the carrying power of the structure.

It is believed that the first laws, treating number of occupants and exits in this manner, were embodied in the 1913 factory laws of the State of New York. These laws have been given wide publicity, and have served as a foundation for other jurisdictions. The comments of your committee upon these laws are not intended in a spirit of criticism, but they are being used simply to illustrate points where betterment is believed to be possible.

The State of Wisconsin in 1914 issued a building code in which the exit problem has been treated similarly as regards the principle, but with sufficient deviation to make an interesting contrast. The fundamental features of the New York law are as follows:

1. The width of stairway required for a single file of persons is placed at 18 inches in building erected prior to October, 1913, and 22 inches in buildings erected subsequent to that date.

2. It is assumed that persons can stand on alternate steps.

**Slide at fourth story; pole at second and third stories.**

**Fire tower at left; excellent outside stairs at right. Note the high enclosures for stairs.**

3. Under ordinary conditions approximately 14 persons may be accommodated in each story for every 18 or 22 inches of stair width available.

4. Stairs, serving as required means of exits, must be enclosed in all new buildings over one story in height, and in existing buildings over four stories in height.

5. Where halls are created by stair enclosures, additional persons per floor are allowed in the ratio of one person for each five square feet of such enclosed hall.

6. Where a division wall exists, the number of occupants may be increased to the point where the total number of persons engaged on both sides of the wall, if transferred to the smaller section, will be available not less than 5 square feet each of unobstructed floor space for standing room.

7. For buildings of certain heights outside fire escapes of good construction and with window openings protected may serve as an additional stairway.

8. For sprinkler protection, the number of occupants is arbitrarily increased 50 per cent.

**Smoke-proof tower stood up in fire in Philadelphia.**

**Straight-run stairs, with few wall openings. Openings are protected. Canopy protects the top flight of stairs.**

HORIZONTAL EXITS.—Your committee feels that unwarranted credit is being given horizontal exits in division walls. No one doubts the ability to move persons more rapidly and safely through a wall opening or across a horizontal bridge than down a flight of stairs, but the trouble lies in the fact that simply passing through a wall in the same building does not guarantee safety to those who have escaped in this way. The New York law requires a

**Unprotected windows at fire escape.**

minimum of one stair exit on each side of a division wall. Such a stair on a building erected prior to October, 1913, may be only 36 inches wide. The minimum number of square feet of working floor area per person is 32. It is possible under the existing act to have a condition such as the following:

1. An unsprinklered joisted building of some height with unprotected vertical openings and a hazardous occupancy.

2. A single stairway on each side of a fire wall, wall being pierced in each story of one or more openings.

3. Approximately 150 people working on each floor on each side of the wall in a building having areas of only 5,000 square feet on each side of the division wall.

4. Fire breaking out in lower floor, making stairway impassible and causing accommodation of 300 persons per floor on one side of wall.

5. Fire spreading through the division wall, owing to fire door not being closed to unprotected belt opening, or to other reason.

6. Hundreds of people jeopardized by fire below them, and the only means of exit a single open stairway.

As we understand it, the law would permit this. It is possible that the authorities, under discretionary power, would forbid it, but it seems desirable to limit the allowable persons per floor, where horizontal exit is provided, in some manner based fundamentally upon the stair capacity. In the hypothetical case cited above, a 36-inch stairway would probably permit 28 persons per floor. To call upon that stairway to take care of 300 persons per floor is obviously safe.

The Wisconsin law of 1914, where horizontal exits are provided, permits an increase of not in excess of 100 per cent. of the persons accommodated by the stairways.

This phraseology is satisfactory where the number of occupants is about equal on the two sides of a division wall, but for unbalanced condition a 100 per cent. increase in the larger area would throw too many persons into a smaller section in case of a fire. Your committee recommends the following:

If a horizontal exit is provided, the number of occupants may be increased 100 per cent. of the normal capacity of

(*Continued on page 522.*)

## REPORT ON OUTSIDE STAIRS BY COMMITTEE ON SAFETY TO LIFE

At the 1914 meeting your committee presented a report on *egress* in the form of a general discussion of this most important subject, and submitted a preliminary draft of specifications for Outside Stairs. The wording "Outside Stairs" has been employed in the recent Building Code of the National Board of Fire Underwriters to differentiate a well designed and installed set of outside stairs from the generally ineffective fire escapes in common use. Your committee has deemed it advisable to use this term in the proposed N. F. P. A. regulations. Under this heading also are covered bridges around walls and into near-by buildings, ladders sometimes advisable leading from top stories to roofs of buildings, and certain other escape facilities not properly classified as stairs. Since presenting its previous report, the committee has made some changes and additions in its specifications, and presents herewith a revised draft, which, with modifications that are made at the 1915 meeting, it is hoped will become an Association standard. Your committee feels that there is a very decided need of specifications such as these, and hopes that they will be favorably received by a number of jurisdictions.

HEIGHT OF BUILDING.

1. Except they be enclosed in a tower, outside stairs, even if well designed and erected, are not recommended on buildings over six stories in height. The fundamental reason lies in the timidity of persons at a considerable height, no matter how safe the conditions may actually be.

TYPES.

2. These specifications cover outside forms of stairs, either attached to buildings or erected independently of them, but connected by bridges, as well as bridges around fire walls and to near-by structures.

Types in common use are:

(*a*) Stairs in superimposed form (parallel to or at right angles to buildings).
(*b*) Straight run stairs (parallel to or at right angles to buildings).
(*c*) Bridges around fire wall.
(*d*) Bridges to near-by buildings.
(*e*) Vertical ladders.

3. Superimposed stairs, if enclosed, generally form a smoke-proof tower.

4. Spiral stairs are not recommended.

5. Straight run stairs are not feasible where exits must be approximately in a vertical line. The protection of window openings is also likely to be more costly with this type of stairway than with the superimposed form.

6. Where ramps are used as exits for hospitals, or leading to floors of near-by buildings not at same level, a slope of not more than 2½-inch rise in 12 inches of length is advised.

7. Ladders are deemed inadvisable in all cases except for use of fire department from top floor to roof.

8. The following detailed specifications shall apply in so far as possible to all of the above types of escapes or to any other forms which may be erected:

LOCATION.

9. The following paragraphs indicate the order of desirability:

10. Stairs enclosed in towers with access through outside balconies or vestibules.

11. Stairs entirely shielded by blank walls, access from wall openings to stairs being by horizontal balconies.

12. Stairs shielded by approved *stationary* metal frame windows glazed with wired glass, and balconies extending in one or both directions to openings protected with approved fire doors or wired glass windows.

13. Where windows cannot be stationary on account of ventilation requirements or for other reasons, stairs shielded by approved wired glass windows and, or approved fire doors, designed to afford ready egress and yet reduce to a minimum the danger of flames reaching the stairs and balconies.

Methods of stair protection in use include:

(*a*) Doors used for ventilation and egress.
(*b*) Casement windows similarly employed.
(*c*) Double hung windows similarly employed.
(*d*) Pivoted windows (not used for escape).

14. Wall opening protection is not essential in the top story, reached by outside stairs, except when stairs or ladders are carried to the roof.

15. Protected zone for stairs of types previously described shall be as follows:

(*a*) For superimposed stairs: zone determined by drawing lines 60° with the vertical outward and downward from points 6 feet to each side of projected stair length at highest level reached by stairs. All openings one half or more of whose area falls inside of this zone shall be protected. Protection need not extend around a right angle corner of wall where stairs are close to such corner.

(*b*) For straight run stairs: protection shall be as above on side away from direction of stair slope and below entire stairway to ground, and in addition all wall openings, any part of which is within 7 feet of stairs or platforms as measured vertically, shall be protected for their entire area.

(*c*) Bridges around fire walls shall be treated similarly to superimposed stairs, the horizontal distance for application of the cone principle to be measured from the sides of openings nearest fire wall at highest level; provided also that protection need not extend more than two stories below the lowest bridge.

(*d*) Bridges to near-by buildings shall be

treated similarly to superimposed stairs, the horizontal distance of application of the cone principle to be measured from each side of the bridge; provided also that protection need not extend more than one story below the lowest bridge.

*Note.*—There is a question as to whether there should be any difference in the number of stories protected below the lowest bridge where bridge passes around fire wall in one case and to near-by building in the other. Reasons for suggesting a difference lay in the fact that bridges to near-by buildings immediately started away from the structures in which fire was supposed to have broken out.

(*e*) For vertical ladders leading from top story to roof, protection shall begin at least 6 feet from each side of ladder, and where 60° line passes balcony of top story, the protection shall be at least 6 feet on each side of projected stair length.

(*f*) In lieu of the above described protection, superimposed stairs and ladders leading to roofs may be protected with fire-resisting wing walls, projecting at least 2 feet beyond outside line of balcony and stairs.

*Note.*—The general question brought up for discussion here, is whether any differentiation should be made between different characters of buildings. Above requirements are undoubtedly fairly drastic, and while they obviously should apply to a fairly hazardous factory, there is a question as to whether they should be demanded in the case of an office building. Discussion on this point is particularly requested.

ACCESS.

16. Insufficient attention has been given the fact that means of escape on office buildings, hotels, clubs, dormitories, apartments and similar structures, are often difficult to reach, especially if halls are filled with fire or smoke. On an open factory floor, all persons can usually reach the exits to outside stairs, but in laying out any system of escape, due cognizance should be given this important principle. Only the best arrangements should be permitted on new buildings.

17. Stairs shall reach all floors above the first, shall be continuous to the ground, or terminate in a swinging stair section, and shall continue to the roof if this is a means of exit to adjoining or near-by buildings, or a safe place for persons to remain. If for fire department use only, a vertical ladder to roof is deemed sufficient.

18. Unobstructed aisles, at least 6 inches wider than opening or openings to outside stairs shall be provided. Space in front of windows or doors to such openings shall be kept clear. No grating, bars nor other obstructions shall be placed at or over any such openings, provided that hinged or easily removed screens may be used, and that it is recognized to be impossible to give persons confined in some institutions unlocked access to means of egress from the building.

19. Doors and casement windows are preferred to double hung windows for giving access to outside stairs. Double hung windows, if used, shall operate readily and be counterbalanced.

20. Doors and casement windows shall swing so as not to interfere with travel.

21. Doors and casement windows to outside stairs shall have minimum width of 30 inches and minimum height of 78 inches.

22. Double hung windows, if used for access to outside stairs, shall have minimum width of 30 inches and minimum clear height of 36 inches. Doors and casement windows shall preferably have openings approximately flush with floor of building, sill to be not over 2 inches high. If door sill is over 12 inches from floor of building, steps shall be provided, and shall have risers approximately 7¾ inches high, and treads not less than 9 inches wide, exclusive of nosings.

23. Outside balconies shall preferably be flush with wall openings, shall not be more than 7¾ inches below wall openings, and never above them.

MATERIAL AND STRENGTH.

24. Iron, steel and concrete only, shall be used, no wood to be employed.

25. Balconies and stairs shall be designed to carry a load of 100 pounds per square foot, with a factor of safety of 6.

*Note.*—This factor of safety is larger than ordinary practice, and is recommended because outside stairs and balconies are unusually subject to weakening through corrosion.

26. Stairs shall be designed to support a concentrated load of 200 pounds at the center with a factor of safety of 6.

27. All supporting members for balconies and stairs which are in tension shall pass through the wall, and be secured on opposite side with wall plates and lock nuts, or they shall be securely fastened to steel framework of the building.

28. Balcony and stair enclosures and railings shall be designed to withstand a horizontal pressure of 200 pounds per running foot of railings or enclosure without serious deflection, and support at walls for such railings or enclosures shall be in manner specified above for tension members.

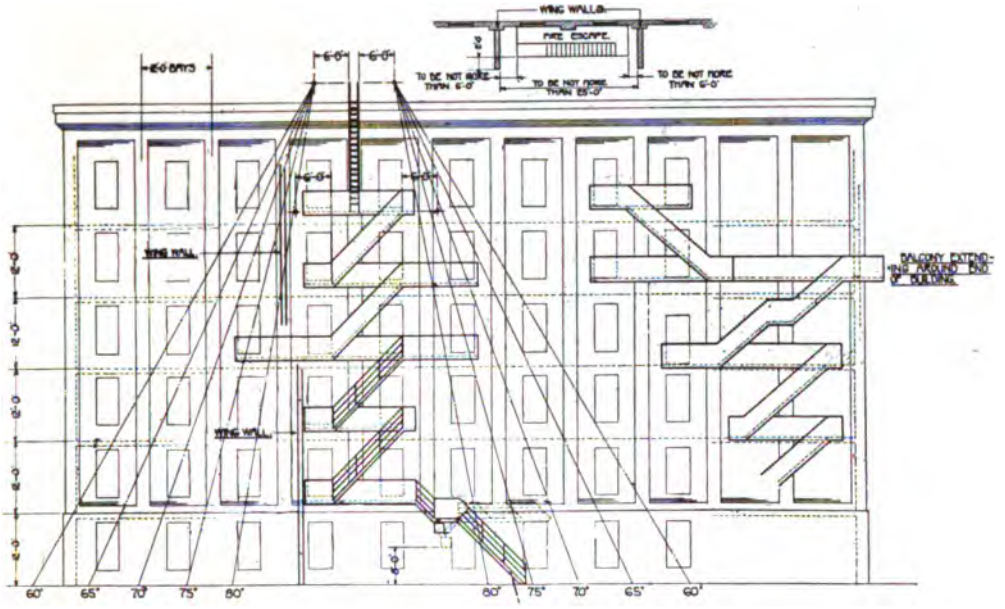
BALCONIES.

29. Size. Where stairs are in superimposed form the length of the balcony shall equal the horizontal length of the stair runs plus an amount at each end at least equal to the width of the stairs. On straight run stairs, the balcony shall be at least 4 feet long. The width of balcony, where stairs are in superimposed form, shall be at least 50 inches between inside of railings, and in straight run stairs shall be at least 3 feet inside of railings.

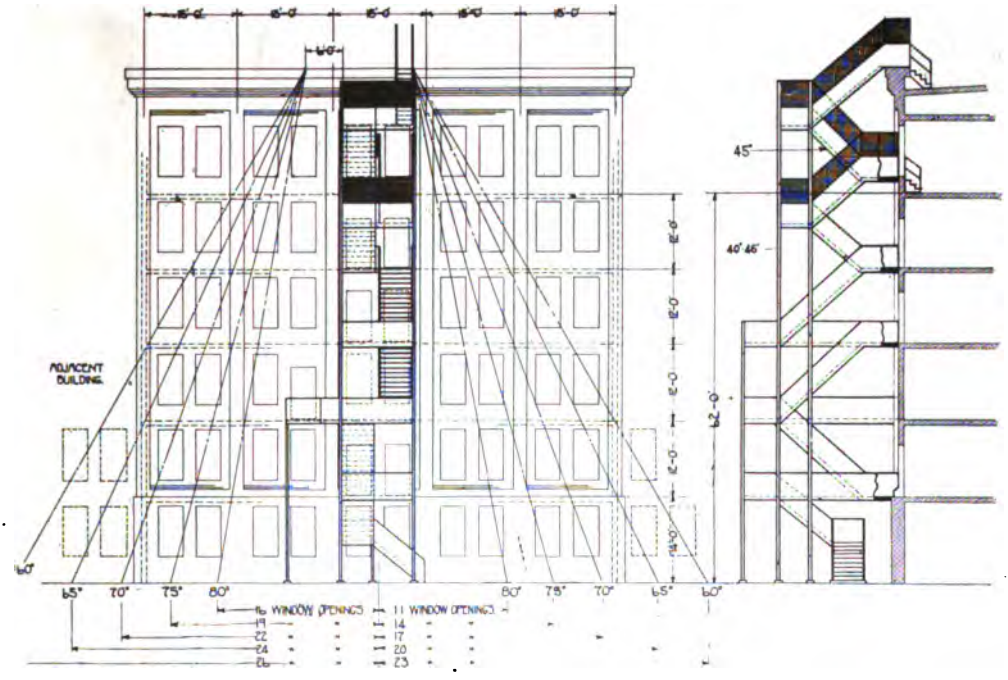
30. The minimum clear unobstructed width of any outside stair passageway, whether parallel to building, or at right angles to it, shall be 24 inches.

31. Floors shall be solid, arranged to prevent slipping, and pitched to secure drainage.

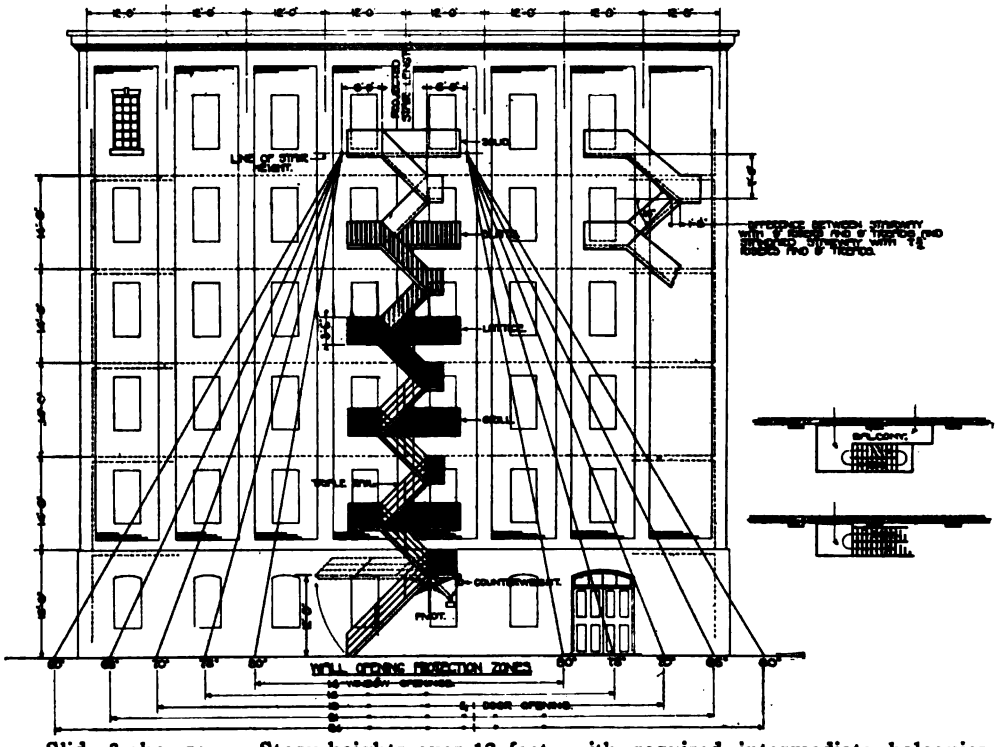
*Note.*—Reinforced concrete, checkered steel plates and safety floorings are among materials available for solid floor construction. Solid floors are specified chiefly to shield


WING WALLS
FIRE ESCAPE
TO BE NOT MORE THAN 6'-0"
TO BE NOT MORE THAN 6'-0"
TO BE NOT MORE THAN 6'-0"
6'-0" BAYS
WING WALL
WING WALL
BALCONY EXTENDING AROUND END OF BUILDING
60° 65° 70° 75° 80°
80° 75° 70° 65° 60°

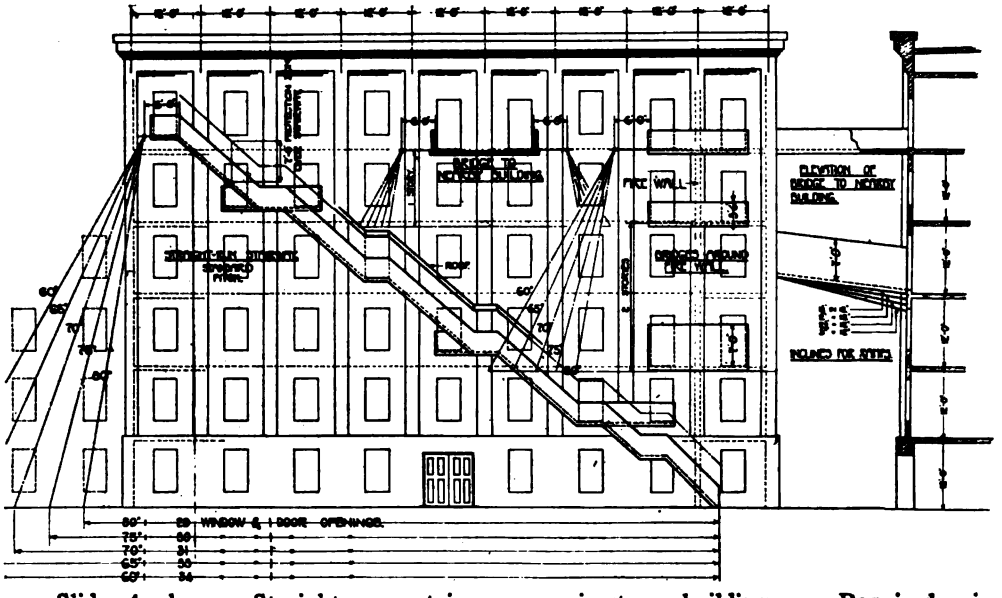
**Slide 1 shows:** Contemplated permissible wing wall arrangement. Various balcony arrangements, reaching two, three and four windows. Ladder to roof. (For use of fire department only.) Possible window protection zone lines at various angles. Section of stairs, shielded by blank wall.



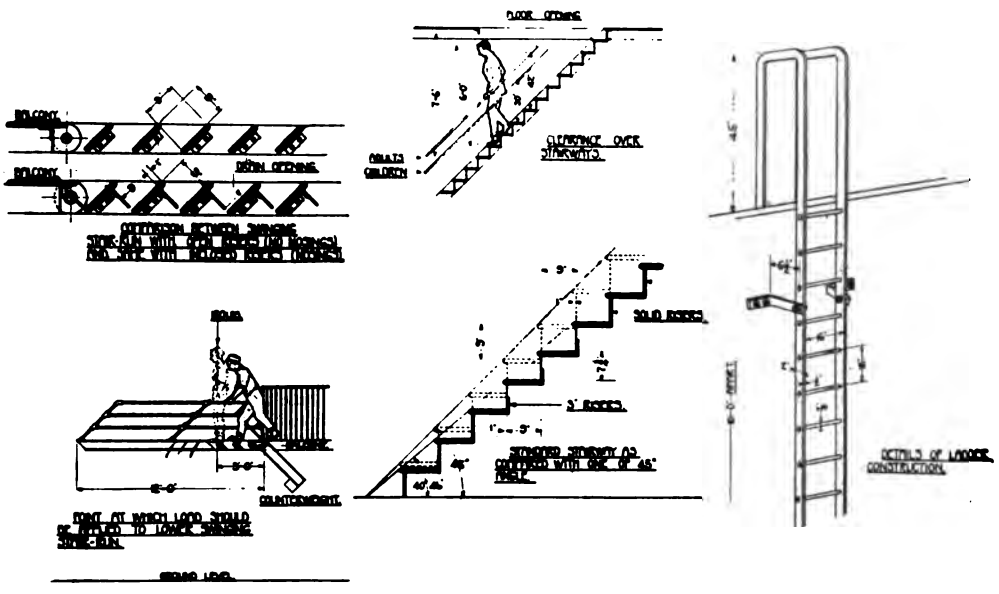

**Slide 2 shows:** Possible window protection zones at different angles, and from two points as regards the top of the stair projection. Number of windows involved in these different zones. Stairs at right angles to building, with various balcony and exit arrangements.



Slide 3 shows: Story heights over 12 feet, with required intermediate balconies. Various types of balcony and stair enclosures and railings. Counterweighted stair section at point 12 feet from ground. Various possible protection zones, with the number of window openings affected on six-story building.



Slide 4 shows: Straight run stairway on six-story building. Required window opening protection (except that this would not extend to windows in adjoining building). Bridge to nearby building, with one-story window protection below. Bridges around division walls, with suggested two-story window protection below same. Ramps at different angles, to show feasible limits.



**Slide 5 shows: Counterbalance stair arranged so as not to start with man standing on first step and to start positively with man standing one-quarter of stair length away from pivot. Comparison between swinging stairs, with and without risers. Provision of head room above stairs. Comparison of angle of standard stair and of 45-degree stair. Details of construction of ladder used in reaching roof.**

against flame, and to prevent timidity on part of persons using stairs.

*Note.*—It has been suggested that slatted floor construction might be permitted within, say 30 feet of the ground. Opinions on this point are solicited.

32. Enclosures shall be not less than 42 inches high, shall preferably be solid, or, if of slatted or grilled construction, no space shall have a horizontal width of more than 3 inches.

33. Enclosures throughout their length shall be free from obstructions tending to break handhold.

34. Enclosures or railings shall be provided for floor openings for stairs, except at head of stairs, and such enclosures or railings shall be capable of resisting the same horizontal pressure specified for outside ones.

35. Passage space shall be smooth and free from any projections or other obstructions.

36. Floor openings for stairs shall be not less than 24 inches wide, and of sufficient length to provide for at least 7½ feet head room, as measured vertically from the stair perpendicularly below the edge of opening.

37. Landings at head and foot of stairs shall be at least as deep as width of stairs.

STAIRS.

*Note.*—For theaters and other places of public assembly, and for schools, hospitals and similar buildings, wider stairs and balconies than specified herein will frequently be necessary. Attention is called to the 1913 specifications of the N. F. P. A. Committee on Theaters, and to the National Board of Fire Underwriters' Building Code.

38. The pitch of stationary and swinging stairs (when down) shall not exceed 45°.

39. Rise shall not exceed 9 inches. Seven and three-fourths inches is recommended.

40. Treads shall not be less than 9 inches, exclusive of nosings.

41. Treads shall be solid, and there shall be no winders.

42. Risers shall preferably be provided on stationary stairs, and, if provided, shall be not less than 3 inches high as measured from the tread.

43 Risers shall be provided for swinging stairs, and shall be full height of stairs, except that space not less than ¼ inch and not more than 1 inch shall be left immediately above treads to provide drainage.

44. Where risers are installed, nosing not less than 1 inch wide shall be provided.

45. The maximum vertical distance between platforms or landings shall not exceed 12 feet. Designs involving many landings and short flights of stairs are not recommended.

46. Minimum width of stairs between rails shall not be less than 24 inches.

47. Railings shall be provided on both sides of stairs, and have height not less than 42 inches as measured vertically from center of stair treads. Space between rails and stringers shall preferably be filled in solidly, or with slat or grill construction, or triple railing may be used.

48. For schools which small children at-

tend, it is advisable to provide a hand rail about 30 inches above the center of the tread in addition to higher one required to safeguard adults.

49. Where possible, stairways shall be built permanently to the ground, and this shall be required in such buildings as schools and hospitals where escapes do not terminate over streets, alleys or private driveways. At all other points, escapes shall terminate in swinging stairway, to which the following specifications shall apply:

(*a*) Width of stairs and character of railing protection to be same as specified above.

(*b*) If distance from lowest platform to ground exceeds 12 feet, an intermediate balcony not more than 12 feet from ground shall be provided, and shall have size not less than width of stairs and not less than 4 feet in length.

(*c*) Counterweight shall be provided for swinging stairs, and this shall be of type balancing about a pivot, no cables being used. Counterweight shall be securely bolted in place, except sliding ball weights or their equivalent be used to hold stairs up and to help lower them. Counterbalancing shall be such that a weight of 150 pounds, one step from pivot will not start swinging section downward, and a weight of 150 pounds, one quarter of the length of the swinging stairs from the pivot will positively cause stairs to swing down.

(*d*) Pivot for swinging stairs shall either have a bronze bushing or have sufficient clearance to prevent sticking on account of corrosion.

(*e*) No latch to lock swinging stair section in up position shall be installed.

(*f*) Latch is suggested to hold stairs in downward position when they have once been swung to ground.

(*g*) Railings shall be designed to prevent any possibility of injury to persons on stairs or balconies at its head when stairs swing downward. Minimum clearance between moving sections where hands may be caught shall be 4 inches.

50. The minimum clearance at all points on balconies and stairs as measured vertically shall be 7½ feet.

LADDERS.

51. Where stationary ladders are carried from top balcony to roof, the following specifications shall apply:

(*a*) Material to be iron or steel.

(*b*) Rails to be not less than 2 inches by ½ inch.

(*c*) Distance between rails to be not less than 16 inches.

(*d*) Rungs to have diameter not less than ⅞ inch, and to be riveted in position.

(*e*) Rails to be supported at intervals of not more than 10 feet.

(*f*) Ladder to extend above roof not less than 45 inches, no rungs to be carried above roof line.

(*g*) Extension on roof to be carried over the coping or parapet so as to insure safety reaching roof.

(*h*) Minimum clearance at any point between center of rungs and building or projections on same to be 6½ inches, except when persons travel between ladder and building, when minimum clearance shall be 24 inches.

PROTECTION OVER STAIRS.

52. Roof or canopy over stairs, especially if of the straight run type, has value as protection against rain, snow, accumulation of ice and falling of icicles.

LIGHTS AND SIGNS.

53. Green indicating lights (where red is not required by law) shall be provided at all exits to outside stairs in buildings which are used during the night, and lights shall be kept burning during the night-time if building is occupied. Two independent sources of light shall preferably be provided.

54. Signs having white letters not less than 5 inches high on a green field, indicating location of outside stairs, shall be provided not only on or near windows or doors leading to stairs, but also at other points in building wherever deemed necessary.

55. If access to outside stairs is through any room, doors shall preferably be arranged so that they cannot be locked. If not so arranged they shall have thin glass panel, and sign on this reading, "To outside stairs, break glass and open door," or some equivalent wording.

Any such indirect method of reaching outside stairs shall be allowed only on existing buildings.

CARE.

56. After being erected, outside stairs shall be painted.

57. Outside stairs shall be scraped and painted at least once a year thereafter.

58. Outside stairs shall be kept clear of incumbrances.

59. Outside stairs shall be promptly cleaned after snow or ice has accumulated upon them.

60. No obstructions such as lighting or telephone wires shall be permitted on or near outside stairs.

61. Particular attention should be paid to possible interference by awnings at windows or over sidewalk, and to other obstructions at or near the street level.

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(*Continued from page* 516.)

a room, provided this increase does not exceed the total number of occupants allowed in the exit room.

STAIR CAPACITIES.—It is correct in figuring the stair capacity in a high building to assume that all persons must be able to find uncrowded refuge in the

stair and hall enclosures. No one would advocate planning to run women employes rapidly down 10- or 15-story high loft building stairs; but, to take the other extreme, there is no need of making equal stair requirements in a 2- or 3-story fireproof factory building.

The New York law, leaving out the question of discretionary powers on the part of the authorities, uses the same yardstick for both situations. Up to a certain height, it should be safe to figure that a portion of the employes at least will be traveling down the stairs and out of the building as others are coming into the stair enclosures. Above a certain height, it should be fair to assume that persons must find refuge in the stair enclosures and substantially stand still.

The Wisconsin Building Code places the division line at seven stories. Assuming that some persons can be leaving the building while exiting from the floors is going on, it follows that it is fair to reduce the required stair width. It would also seem as though the character of construction might properly have a bearing upon the required stair width. The chart which is used in the Wisconsin Building Code is as follows:

In ordinary or frame buildings, 60 inches per 100 persons.

| | Fireproof, sprinklered. | Fireproof, not sprinklered. | Mill, sprinklered. | Mill, not sprinklered. | |
|---|---|---|---|---|---|
| .... | 30 | 50 | 40 | 60 | inches per 100 persons on 2nd floor |
| plus | 15 | 25 | 20 | 30 | " " " " " 3rd " |
| plus | 12 | 20 | 16 | 24 | " " " " " 4th " |
| plus | 9 | 15 | 12 | 18 | " " " " " 5th " |
| plus | 6 | 10 | 8 | 12 | " " " " " 6th " |
| plus | 3 | 5 | 4 | 6 | " " " " " 7th " |
| plus | 0 | 0 | 0 | 0 | " " " " " 8th " or above, |
| | 30 | 50 | 40 | but in no case shall such total width be less than 60 in. per 100 persons on any one floor. | |

It will be observed that the minimum width of stairs per 100 persons on the second floor is 30 inches for a fireproof sprinklered building and 60 inches for an unsprinklered frame building. If 100 persons are on the third floor, the increase in required stair width is 50 per cent., namely, to 45 and 90 inches, respectively. If there are 100 persons on the fourth and 5th floors also, the stair widths have been increased to 66 and 132 inches, respectively.

Finally, for a 7-story or higher building, the minimum widths for the building are 75 and 150 inches respectively per 100 persons of floor. The 150-inch requirement is substantially that of the New York State law for new buildings.

Your committee feels, as stated previously, that the height of the building and its construction should have a bearing upon the stair width. Whether or not the allowance for sprinklered protection should go into such a table or be in the nature of an additional percentage allowance is questionable. No stairs less than 36 inches wide in existing buildings or less than 44 inches wide in new buildings should be permitted, and no credit should be given for increase except in multiples of 18 or 22 inches or more respectively.

EXITS BASED ON AREA.—There is a tendency for laws to require not less than two exits for areas up to 5,000 square feet and an additional exit for each 5,000 square feet or fraction thereof. The New York law contains such a requirement. It seems unwarranted, because the law limits the number of persons in accordance with the exits, and in many factory buildings the persons on a floor of 10,000 to 15,000 square feet area will not overcrowd two approved exits. It seems rather a hardship for a law to limit a property owner in two directions. There should, however, be a limit to from 75 to 100 feet, as measured along

passageways for the distances any person may be from an exit.

VERTICAL OPENINGS. — Unprotected vertical openings have been the chief cause of rapid spread of fire and of loss of life in many of our notable disasters. The New York law does not require enclosure of stairs in existing buildings up to and including four stories, although it does in buildings erected after October, 1913. Every competent fire prevention engineer fears the unprotected vertical opening, and would like to see it legislated out of existence in practically all classes of industrial and public buildings. Your committee does not feel that persons to a moderate number are safe on the fourth floor of an unsprinklered building having open stairs, and provided the occupancy is only of reasonable hazard. Our report on the Binghamton fire is pertinent. It will be remembered that that was a 4-story brick, joisted building, with open stairs and a clothing factory occupancy.

It is also necessary to have in mind that open elevators, light shafts, belt holes and other floor openings have a distinct bearing on escape, even if stairs are effectively enclosed. A building with enclosed stairs of adequate capacity and unprotected floor openings has far greater loss of life possibilities in it than one in which floors are at least effective fire and smoke stops.

Your committee recommends:

1. The enclosure of exiting stairs in buildings *three* stories or higher where occupancies are manufacturing or mercantile in character and where buildings are neither fireproof nor sprinklered.

2. With other characters of occupancy, the enclosure of vertical openings in buildings *four* stories or higher, if they are neither fireproof nor sprinklered.

3. Generally speaking, the enclosure of vertical openings in all buildings *five* stories or higher not covered in the above.

Buildings higher than the above having enclosed stairs could be given a 50 per cent. stair capacity rating. Special attention is called to the need of enclosing basement stairs. Stair enclosures should be of the type enclosing halls and not of the floor to floor design.

Attention is called to the fact that, if it is advisable to permit a given number of persons per floor in certain buildings with unprotected openings, it is only fair to permit more in a similar building with enclosed vertical openings. The protection of such openings should be encouraged.

AUTOMATIC SPRINKLERS.—The New York law recognizes the value of sprinklered protection through a flat increase of 50 per cent. in the number of persons who may be accommodated, as determined by the available exits. The Wisconsin law does substantially the same thing. Those of us who know sprinklered efficiency and the remarkable freedom from loss of life in sprinklered buildings feel that this allowance might be doubled with safety, certainly as viewed comparatively. It is hoped that more and more legal recognition will be given the automatic sprinkler. For data is made in the 1914 report of this committee.

OCCUPANCY.—In so far as your committee knows, none of the laws of the country base exit requirements in any way upon the character of occupancy of the building. No one would class the life hazard in a given building occupied as a machine shop with the existing danger if the building were occupied as a celluloid factory. Discretionary powers might be exercised under some laws to take care of an extra hazardous situation, but it would seem as though it should be possible to establish a number of classifications which would have a definite hearing upon the required exits. To a certain extent, the insurance rates on different classes of occupancy could be used as a foundation for such an arbitrary division.

In conclusion, your committee has presented herewith for consideration certain comments upon the restriction of horizontal exits and in addition to that has taken up the following items as having a bearing upon the number of persons who may be accommodated by given exits:

Height of building.
Character of construction.
Vertical openings.
Automatic sprinklers.
Character of occupancy.

There may be other factors, which enter, but these admittedly are the most important ones. It would seem as though the modification of existing laws and the drafting of laws in the future might very properly take these factors into account, to the end that every incentive be given for the erection of only the best types of buildings in the future and for the correction of many of the correctible defects in existing structures.

## SAFE GRINDING

This picture, taken at random in the shops of the Southern Pacific Company, indicates that the road is interested in safety from other than the public standpoint. The grinder indicates effective guarding throughout, with the exception of the belt, which should be guarded to a height of six feet from the floor.

Attention is drawn to the fact that proper tool rests are provided and that the operator is using goggles, as required by the company, the goggles giving full protection to the eyes of the worker, without retarding his effciency.

With the belt guarded as suggested, this grinder presents very little possibility of an accident occurring.

**Grinder guarded. Workman's eyes protected by goggles.**

## DANGEROUS PRACTICE.

It is a common practice of boys, while riding on bicycles, to catch hold of railroad cars, automobiles and wagons. It is plain to observers that it is a dangerous practice and an unnecessary way of going along.

**Never hitch on to the side of a train, when riding your wheel.**

The accompanying picture illustrates the cause of an accident to a call boy who was riding along the track of the El Paso & Southwestern System. He caught hold of a moving train, and when he fell he was struck by an oil box on one of the car wheels. It was a narrow escape from death under the wheel.

By far the most important feature of organized safety work has been workmen's inspecting committees.—*C. M. Price.*

## PROTECTION FROM BROKEN GAUGE GLASSES.

Gauge glasses are very brittle, even though annealed carefully, and they are under stress from unequal heating and cooling. The danger and annoyance from them when they break are such that some engineers on locomotives and firemen or water tenders where high pressure steam is used prefer to rely on the gauge cocks to tell where the water is. Realizing that it is not safe to operate a boiler without a gauge glass, the Inland Steel Company has equipped the gauge glasses on its boilers with an enclosing cage which prevents broken glass flying if a gauge glass be broken from any cause. The illustration shows how it was done.

**Water Gauge Glass Guard.**

## SAFETY IN ORDERLINESS.

One feature of the yard shown in the accompanying illustration that will excite favorable comment, is its orderliness. The planks piled as they are instead of being thrown in a slovenly heap and the stacking or piling of the rolls in the background speak very loud for good housekeeping and good discipline.

The elevated portions of the roof on the building, in the background, were so placed to ventilate the hot beds which are located therein.

This example of orderliness can be followed to advantage by the managers of plants in the various industries. It is a constant reminder of forethought.

## SEMAPHORE TO PREVENT ACCIDENTS.

The problem of keeping sufficient room between the steps of street cars and passing automobiles has been solved by the placing of "Safety First" semaphores at corners where the cars stop.

Each semaphore is a short distance away from the side of a car, with sufficient room between for pedestrians. Automobiles must pass to the right of the sign, "Vehicles Keep to the Right," that indicates to the driver how near to a car he may pass. This safety zone device has worked satisfactorily.

**Device for Zone of Safety.**

# SAFETY EXHIBIT AT SAN FRANCISCO

TODAY the individual or institution that has developed something worth while must undertake to educate the public concerning its value before the people can be expected to show any great interest in it. The general movement for safety has been propagated largely through safety slogans; yet, to make safety certain, the public had to be educated along specific lines.

Realizing this fact, the Workmen's Compensation Service Bureau, through its general manager, Albert W. Whitney, authorized the secretary and chief of the Department of Accident Prevention, Inspection and Merit Classification, Carl M. Hansen, to divide industrial accidents into their special groups; for instance, machine shop and foundry, wood working, etc., and to compile standards of safeguarding for each group and also the great field of general liability.

Two years have passed since the resolutions were made, and the general machine shop and foundry standards have been published under the title of "Universal Safety Standards." In the course of compilation are standards for the laundry, woodworking, milling, mercantile, mining, paper, printing, clay working, etc., industries.

To further the interest in these branches, the Workmen's Compensation Service Bureau authorized Alonzo H. Gentry, architect, to proceed with the plans and specifications submitted by him for an exhibition booth in the Palace of Mines and Metallurgy, Insurance Division, Panama-Pacific International Exposition, San Francisco, the booth to house for display some 700 original, perspective and detail drawings of machines guarded and guarding devices used in the "Standards."

The architecture of the booth is based on the classic, but made thoroughly modern by the use of lattice and pergola beams. Particular care was taken by the architect in the effort to keep the booth dignified and pleasing in appearance, avoiding as much as possible the unreal, grotesque and garish ornament so common to exhibition booth architecture; also making the booth an attractive resting and meeting place for visitors.

Starting with the general scheme of green and white, the symbolic colors of safety, the architect has evolved the entire booth on this basis. The columns and arches are built up over green burlap. All woodwork and lattice is painted a cream white and the back walls are covered with green burlap. The drawings are framed in birch, enamelled white. The drawings on the back wall illustrate one complete inspection of a plant, demonstrating the use of the Universal Analytic Schedule. The remaining drawings are exhibited on special display racks at either side of the booth, there being 500 drawings, covering the general machine shop and foundry standards alone.

The furniture is constructed of the best German reed upholstered in mottled green Pompeiian cloth, all the furniture being made to order from drawings. Trellis of springeri ferns and wandering jew carry out the green scheme on the pergola beams and the roof. The booth is situated in the center of the block between Avenues B and C on Second street.

The Aetna Life Insurance Company is the neighbor on the right. The Aetna has an exhibit which deserves exceptional mention, especially in conjunction with the description of the Workmen's Compensation Service Bureau's booth, in that it has a practical application of the theoretical principle displayed in the drawings exhibited in the bureau's booth. Visitors may see the theoretical guarding of a punch press in the bureau's booth and the actual application in the Aetna's booth. The Aetna has its machines guarded according to the "Universal Safety Standards."

The booth is the meeting place of safety men, insurance men and the general public. The interest manifested in it has been great. The builders and the exhibitors feel that interest of the general public, with whom this movement is most vitally concerned, has been aroused deeply.

VIEW OF WORKMEN'S COMPENSATION SERVICE BUREAU'S BOOTH, PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

**VIEW OF INTERIOR OF WORKMEN'S COMPENSATION SERVICE BUREAU'S BOOTH, LOOKING TOWARD THE AETNA INSURANCE COMPANY'S BOOTH.**

**Traveling Safety Exhibit of the Department of Labor and Industry of Pennsylvania.**

# TRAVELING SAFETY EXHIBIT

*John S. Spicer, Chemical Engineer, Pennsylvania Department of Labor and Industry.*

IT HAS been the endeavor of Commissioner John Price Jackson, of the Pennsylvania Department of Labor and Industry, to acquaint the citizens of the Commonwealth with the idea of safety as a universal movement and to promote the idea among the employers and employes of Pennsylvania.

Two years ago, previous to the establishment of the Department of Labor and Industry in Pennsylvania, the safety movement was practically unknown, with the exception that many of the largest industrial plants in the State had, on their own initiative, organized safety committees and attempted to educate their employes to ideas and practices tending toward greater safety in their work.

Today practically each industry of appreciable size not only has formed safety committees and other safety organizations, but has been doing all in its power, through poster, bulletins, lectures, motion pictures, etc., to inculcate the safety idea in the minds of its employes. Two yearly conferences have been held in Harrisburg by the Department of Labor and Industry, at which employers, employes, representatives from other State departments, persons of prominence in the industrial and educational world, and those of the general public interested have been present. The conferences have resulted in a better understanding between employer and employe and generally a deeper interest in safety methods and practices.

Under the direction of Commissioner Jackson, a Traveling Safety Exhibit was prepared last fall. Many manufacturers in the State, and also the engineering department of the Pennsylvania State College, co-operated in the preparation of the exhibit. It consists of a collection of safety devices that have been contributed by the manufacturers, inventors or owners of the devices.

It is the intention of the department to show only those articles that can truly be called "safety devices" and are actually serviceable in preventing accidents. Department stores in towns and cities have generously loaned their windows for the display. As

soon as the exhibit is located in a town, the department's official in charge gets into communication with the editors of the papers and invites their co-operation. On request, he furnishes articles that relate to the safety movement in general, and also detailed descriptions of the exhibit.

In advance of the arrival of the exhibit, letters are sent by the commissioner to the manufacturing establishments in the vicinity, directing attention to the future display and requesting that the manufacturers post notices on the bulletin boards in their plants for the attention of the employes, asking them to visit the exhibit and examine carefully the articles displayed.

The procedure has been successful. Newspaper editors and manufacturers have given their hearty co-operation in the great majority of cases, and the exhibit has had the widest publicity. The store window displays have had many hundreds of visitors and have attracted much attention. Night after night, crowds, four and five persons deep, have stood at the windows, looking at the various articles. The brief experience of the department in conducting the exhibit has shown its great educational value. The public has proven itself interested in this phase of the safety movement and eager to obtain all the information possible.

The use of store windows came about almost by chance, but it has proven the best method tried. At first the exhibit was placed in the halls of the Y. M. C. A.'s, and the public was invited, through notices in the daily papers, to attend the display. The window exhibit has reached a far greater number of persons and a greater variety, because, passing in the street, they would stop to look at the display in a window, although they would be unwilling, or not interested enough, to go inside a building for the same purpose. So it was determined to discontinue the practice of having the exhibit in halls and to keep it traveling from week to week through the store windows of the principal cities and towns of the State. During the past six months the programme has been followed, and the exhibit has been displayed in about 25 towns.

Several other States, according to information obtained by the writer, have permanent safety exhibits, but it is believed that the traveling exhibit of the Pennsylvania Department of Labor and Industry is the only one in the country. An exhibit that is accessible to people in all localities, and that reaches people in all occupations in life, is evidently of wider influence than one located centrally in a State, which location, for the majority of the citizens, would take time and money to reach.

The success of the work has been so apparent that it seems evident that similar exhibits, established by other State departments of labor, can aid in the furtherance of the safety movement throughout the country. A campaign of this nature depends for its success on publicity, and it has been the experience of the Pennsylvania department that publicity can be obtained in no way better than by means of a traveling exhibit.

## ARMFULS OF MATERIAL.

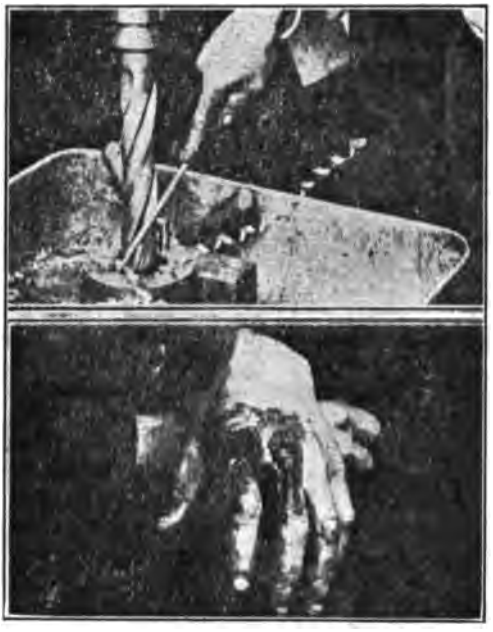
"I think it is a dangerous practice to carry an armful of loose posts down the stairs, especially while being held over the shoulder," said an employe of the Northern Furniture Company, Sheboygan, Wis. "I suggest that, when there are more than two or three long pieces to be carried, the elevator should be used instead of the staircase."

## PROJECTING NAILS.

Men from any department who open or empty kegs, barrels or boxes should see to it that no nails are left projecting or bent over, suggested a workman of the Northern Furniture Company, Sheboygan, Wis. The nails should be pulled out entirely, or shorter ones driven in to hold the container together. If this rule is followed, nail scratches will soon be a thing of the past.

## CUT BY METAL SHAVING.

More than half the accidents in the machine shops are caused by metal shavings, says a safety bulletin of the Ford Motor Company. Men are warned against removing them with their hands, or with metal hooks. The



**Cause and Effect.**

upper picture shows a workman improperly removing shavings with a wire hook. The hook was caught by the drill and the man's hand cut. He lost time and money because he was careless. He should have used a wooden stick, or stopped the machine.

## SAFETY EXHIBIT AT EXPOSITION.

The attention of the members of the National Safety Council has been directed by Secretary Cameron to the safety exhibit by the United States Bureau of Labor Statistics at the Panama-Pacific Exposition, San Francisco. The exhibit shows for the first time a large-scale study of the results of accident prevention work and illustrates some of the new methods in safety activity which are being developed by the bureau. Members of the council, visiting the exposition, will be welcomed by the person in charge of the exhibit. It is believed that a careful inspection of the material shown will prove to be one of the most important educative contributions at the exposition.

## RAILROAD HAZARDS.

**Foot Caught Between Rails. Wooden Guard Is Not Satisfactory.**

**Coupling Cars While in Motion. Very Dangerous Practice.**

# ACCIDENT PREVENTION SERVICE IN 1914

## THE TRAVELERS INSURANCE COMPANY.

BEARING steadily in mind its well-known maxim that the prevention of an injury is a benefaction while compensation for it is an apology, the Travelers Insurance Company made marked progress in its work of accident prevention in 1914. The public everywhere showed a rapidly increasing appreciation of the benefits, economic as well as humanitarian, that result from systematic, intelligently conducted efforts to prevent industrial accidents. This tendency, although very encouraging and stimulating, has given rise to problems of ever-increasing complexity and difficulty. With growing realization of the possibilities of practical work of this kind, an increasing demand for it has come from all directions, and to cope with this demand efficiently the Travelers has continually broadened and extended its activities, and has continued its study of accident prevention methods along special lines, ramifying in countless directions and covering not only manufacturing but also transportation, mining, construction work, power production and transmission, chemical industries—in fact, the useful arts in general.

Successful accident prevention work covering the entire range of industrial activity requires first of all a competent executive staff, with broad and varied experience and a wide knowledge of principles and facts. In the Travelers Insurance Company and the Travelers Indemnity Company this staff consists of a chief engineer, an assistant chief engineer, and numerous other engineers who act in an administrative and advisory capacity. These men supervise the work as a whole, and they also deal with special problems, emergency cases, and all new matters that may come up. Associated with them is a large force of scrutinizers, who examine and check the reports of the 200 inspectors that are maintained in the field.

To obtain a full measure of success in accident-prevention work, it is important for the field inspectors to be both reasonable and tactful in making recommendations for safeguarding dangerous conditions. Every inspector can relate many experiences wherein employers have differed with him as to the necessity of safeguarding particular machines or conditions. To the inspector the condition may seem dangerous enough to call for a safeguard, while to the employer the chance of accident seems so remote that he considers it a waste of time and money to install the guard. It is part of the duty of the inspector to satisfy the employer on this point, and to persuade him that the installation of the guard is well worth while; but it is also a part of his duty to avoid putting the employer to needless trouble and expense, by asking him to do unreasonable things that are required neither by law nor by a proper regard for safety. In other words, to be a field man of the first order the inspector must not only have a competent knowledge of his business, but must also exercise nice judgment, and be something of a diplomat.

The mechanical features of safety engineering can be well taken care of by the competent inspector. He is familiar with the different safety appliances that are used in factories and workshops, and he knows their worth. He will see that gears, wheels, and projecting set-screws are properly guarded; that shafts, pulleys and belts are boxed in or otherwise effectively protected; that belt shifters of a practical and substantial design are installed; that stairways, ladders, platforms, and raised gangways have guard rails and toe boards to prevent men and material from falling; and that lighting (both natural as well as artificial), sanitation and ventilation are up to the standard. But even after taking all these precautions, and perhaps many others in addition, the most important and difficult part of accident

prevention work still remains to be done. It has been estimated that from 30 per cent to 35 per cent of the avoidable accidents of our industries can be eliminated by the installation of suitable safeguards; the elimination of the remaining 65 per cent or 70 per cent being largely a matter of education, instruction and supervision. The inspector who has a definite territory to cover, and who can, therefore, give to each plant only time enough to thoroughly examine its physical condition at the time of his visit, cannot deal effectively with this personal branch of the work. He can indicate the lines along which problems of this kind should be handled, but the actual work must necessarily be done by safety committees, or local safety inspectors, who will attend to the instruction of new employes, see that careful and competent men are assigned to supervise dangerous work, discipline the careless man or the chance-taker, provide for the distribution of safety literature, post warning placards and signs, and perform other duties also.

The work of educating and instructing the workers along safety lines is growing more difficult each year, because in many plants the workers are coming to be of a distinctly inferior order. The difference is quite marked when the plants of today are compared with those of a decade or two ago. In metal working, for example, the productive capacity of the tools and machines depends upon the design of the machines, as well as upon the skill of the workmen. Formerly the skill of the workman was by far the more important factor of the two, but today the relative importance of man and machine has been almost wholly reversed, in many cases. A piece of work that only a few years ago required the services of a skilled mechanic can now be produced by an automatic machine, attended by a "hand" who may know very little of the process of manufacture, or of the construction of the machine that he operates. This gradual trend toward automatism in machine operation has been accompanied by a gradual elimination of the skilled mechanic in favor of the cheaper unskilled laborer. Production by specialized machinery has brought forth a class of men who need little or no skill beyond the ability to operate one specific machine, which is largely automatic; and this is slowly eliminating the all-around machinist. The term of apprenticeship has been cut down to the time necessary for a man to become proficient in the operation of one or two machines. He can then earn a living wage so long as there is a demand for the product of the machines that he can run, and any further time spent in the apprentice shop seems, to these men, to be wasted. This tendency toward the replacement of skilled labor by labor saving devices and unskilled labor has been manifest in all classes of industry, and it must be carefully considered in connection with accident-prevention work.

Having in mind the importance of education and the formation of a healthy "Safety First" spirit among the workers, the Travelers Insurance Company, in addition to maintaining a large force of skilled inspectors in the field, has organized a Department of Technical Publication, the work of which consists chiefly in the preparation and publication of articles, books and pamphlets dealing with engineering and accident prevention topics. For the past two years this department has issued a monthly 20-page journal known as *The Travelers Standard*, each issue of which contains timely articles of much value in connection with accident prevention work. This journal deals with engineering matters of all kinds, but its main effort is directed toward safety engineering as applied to construction work, manufacturing, mining, power generation and transmission, the electrical and chemical industries, and every other form of activity in which machinery or tools are used, or human life and limb are imperilled in the doing of productive work. The circulation of this journal greatly increased in 1914 and the journal itself has been everywhere found to be helpful and authoritative.

The series of technical booklets that

was begun at about the same time has also been continued, and a number of important subjects have been treated in this way during the past year. The first issue, which was entitled "Grinding Wheels," describes and illustrates approved methods of safeguarding emery wheels, grindstones, polishing wheels and grinding wheels made from alundum, carborundum and other similar products. Recommendations are given covering the safe speeds at which such wheels may be operated, as well as proper methods for mounting and using them and for removing the dust produced by the grinding.

The second booklet, on "Elevators," outlines the principal safety requirements for elevators for both passenger and freight service. It is fully illustrated with engravings showing safety devices and other approved features of modern elevator practice.

The next booklet in the series, entitled "Boiler Economy," deals with the economical and safe operation of a boiler plant. The fuel problem, firing by hand and with mechanical stokers, the treatment of feed water, methods of cleaning a boiler, and the use of feed water heaters and of economizers and superheaters, are among the many useful topics that are thoroughly and authoritatively explained. This booklet has had an especially wide circulation and it has elicited many expressions of appreciation from owners and users of boilers, and from manufacturers in general.

"Accident Prevention in Paper Mills" and "Illumination and Accident Prevention in Paper Mills " are the titles of two booklets devoted to safety in the paper industry. The first of these deals with the hazardous features that are met with in and about paper mills, while the second points out the increased dangers in such mills by reason of poor illumination, and shows how greater safety may be secured by more rational treatment of the lighting plant. The demand for these booklets was so great that a second edition was necessary within a short time.

The next booklets, called "The Employe and Accident Prevention" and "Foremen and Accident Prevention," have had the widest circulation of any that have thus far been issued. The purpose of the first is to call the attention of the workman, in simple, concise English, to the more common causes of accidents. Most of the suggestions that are made are familiar and obvious, yet it is the neglect of these very precautions that causes a great majority of the accidents of our industries. As the preface says, "If the past experience can enable us to judge the future, more than 10,000 of the workers of the United States who are alive today will be dead in one year from this date, merely because they did not heed the suggestions that this little book contains." Although the first edition of "The Employe and Accident Prevention" was made very large in view of a probable heavy demand, the actual demand exceeded all expectation, and the booklet is already in its third edition.

"Foremen and Accident Prevention" treats the same subject from the administrative viewpoint, and is addressed to foremen and other authoritative persons who have the power to remedy the hazardous conditions and practices mentioned in the book. It deals in greater detail with many of the subjects treated in "The Employe and Accident Prevention," and for this reason administrative officers should study the two books together. The demand for this book has been second only to that for the one which is addressed to the employe. It was issued at a later date, but the second edition is already approaching exhaustion.

In connection with the two last mentioned booklets, another closely related one has been published under the title "Organization of Safety Work in Industrial Plants." This points out the importance of organizing the safety work, in order to obtain the most satisfactory results. It tells how the organization should be effected, explains the nature and duties of safety committees, suggests ways in which foremen can help the work along efficiently, discusses the language problem and the qualifications and duties of interpreters,

gives many suggestions for safety rules, shows illustrative forms for report blanks of various kinds, and contains numerous other data that should be exceedingly useful to employers who are actively engaged in safety work, or who contemplate engaging in such work.

A booklet has also been issued under the title "Safety in Moving-Picture Theaters," which treats of the special hazards that have to be considered in connection with entertainment places of this kind. The first section deals with entrances, exits, stairs, tunnels, seats, aisles and floors and their bearing on the public hazard. The second section discusses the dangers connected with the operation of the moving-picture machines and with the type, location, size and construction of the booth. The various fire and electrical hazards within the booth are fully discussed.

"Accident Prevention on the Farm" is the title of the latest booklet of the series that has been printed up to the time of writing the present article. The hazards connected with farm work have not hitherto received proper attention in safety literature, very likely because qualified writers have not appreciated the enormous number of casualties that occur in connection with agricultural pursuits. The booklet is thoroughly practical. The advice that it contains is "close to the soil," and farmers who adopt the suggestions presented in it will find that the number of accidents on their farms will be materially reduced.

During 1914 a great deal of work was done toward the preparation of a large, fully illustrated treatise on scaffolding in all its more important forms. This is nearly ready to go to press. It has been written with extreme care and it is confidently believed that it will at once take rank as the leading authority upon American practice in the use of scaffolds and stagings. This subject has also been strangely neglected by writers on safety, although it is known that there are many lives lost every year through accidents connected with scaffolding.

Another large work, dealing with the illumination of industrial plants, is also in an advanced stage, and will be brought out in the near future. Many accidents that are ordinarily assigned to other causes are really due to poor illumination, and could easily be avoided if the lighting system were installed in conformity with sound principles. Illuminating engineering has already risen to the rank of a special profession, and in this treatise we shall give the general results of theory and experience, so far as they are useful in connection with the illumination of shops, factories and other industrial plants.

The Travelers Insurance Company proposes to continue the publication of works of the character reviewed above, and the activities of the past year in this direction may be taken as prophetic of future work of a like nature.

## SAFETY IN GAS SERVICE.

The United States Bureau of Standards has undertaken a study of safety in connection with the use of illuminating gas, natural and artificial, especially with the distribution of gas and with its utilization in the household and in manufacturing. A study will be made of municipal requirements in cities of the rules of the gas companies regarding safety in the handling and the distribution of gas, and of the design of gas appliances. It is hoped that improvements may be made and greater care exercised as a result of the study, and that assistance may be rendered to the companies and the cities in providing proper rules and restrictions to secure greater safety.

The design of gas appliances, such as room heaters, water heaters, and cooking ranges and devices, will be noted with respect to efficiency and safety, including, under the latter, the questions of incomplete combustion of the gas and ventilation of rooms containing such appliances.

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Practically all plants which have done efficient safety work have found it practical to appoint one man as safety inspector.—*C. M. Price.*

# ELEMENTS OF SAFEGUARDING

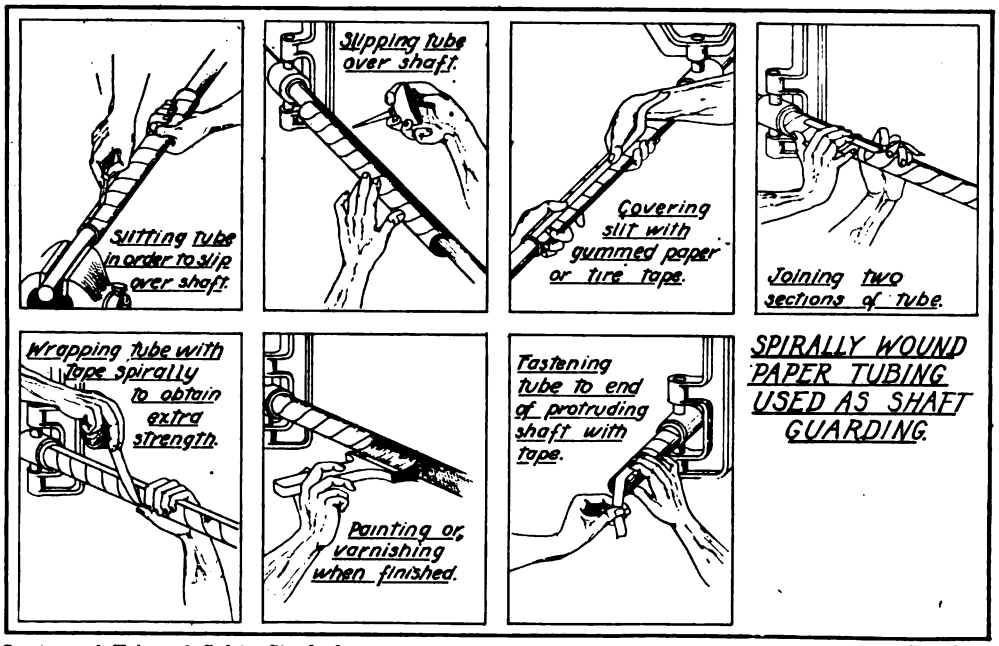
## SHAFTING, PULLEYS AND BELTS.

*By F. W. Bail.*

THE guarding of power transmission, that is, shafting, pulleys and belts, is of primary importance in practically all shops. Comparatively few shops have as yet adopted the safe and efficient, direct motor-driven system. More use the group drive, but the majority still adhere to the old, line-shaft drive with its counters, and undoubtedly will continue for years to use it, although safety and efficiency plead in unison for the elimination of it.

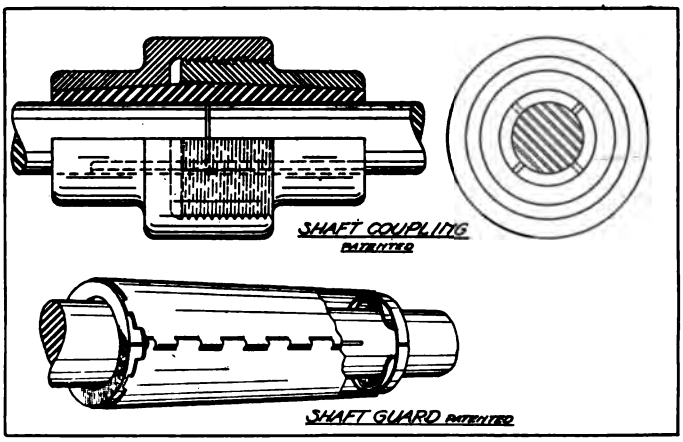
As long as used, however, the guarding of these elements of transmission should be considered carefully, not only from the standpoint of affording all possible safety to workmen, but also from the standpoint of economy in installation.

Exposed shafting, on which, according to statistics, 9 per cent of the accidents from mechanical hazards occur, is often found unprotected in shops where belts and pulleys are quite well


Slitting tube in order to slip over shaft.
Slipping tube over shaft.
Covering slit with gummed paper or tire tape.
Joining two sections of tube.
Wrapping tube with tape spirally to obtain extra strength.
Painting or varnishing when finished.
Fastening tube to end of protruding shaft with tape.
SPIRALLY WOUND PAPER TUBING USED AS SHAFT GUARDING.

Courtesy of Universal Safety Standards. Copyright.

**Fig. 1.**




Courtesy of Universal Safety Standards. Copyright.

**Fig. 2.**

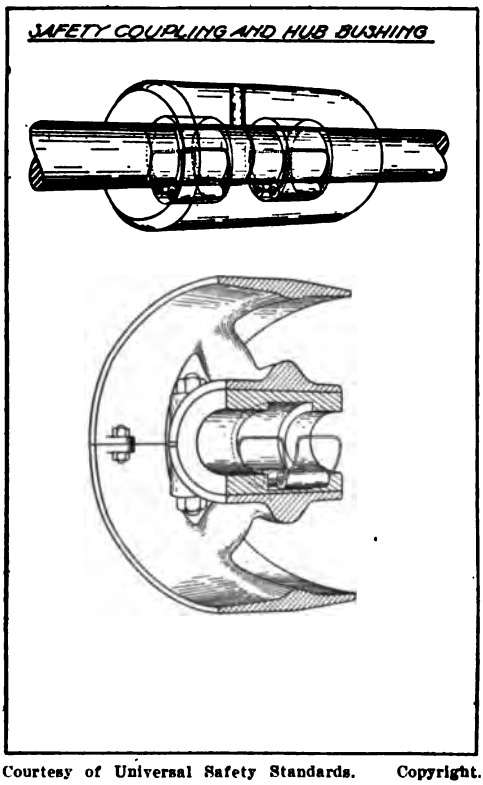



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**Fig. 3.**

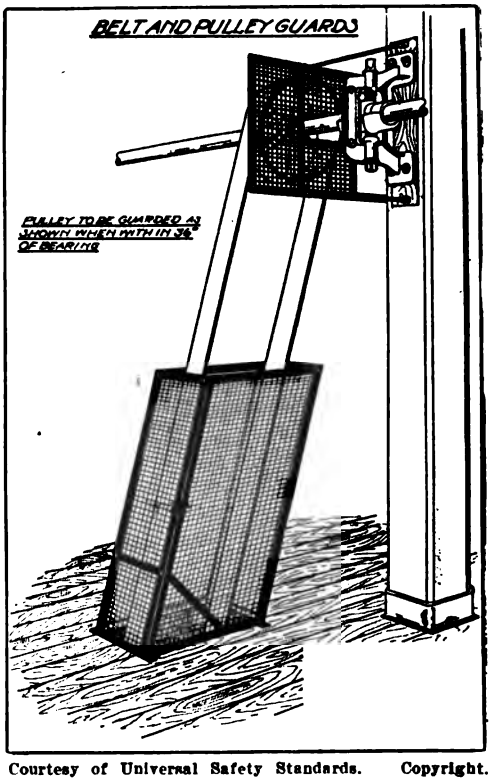


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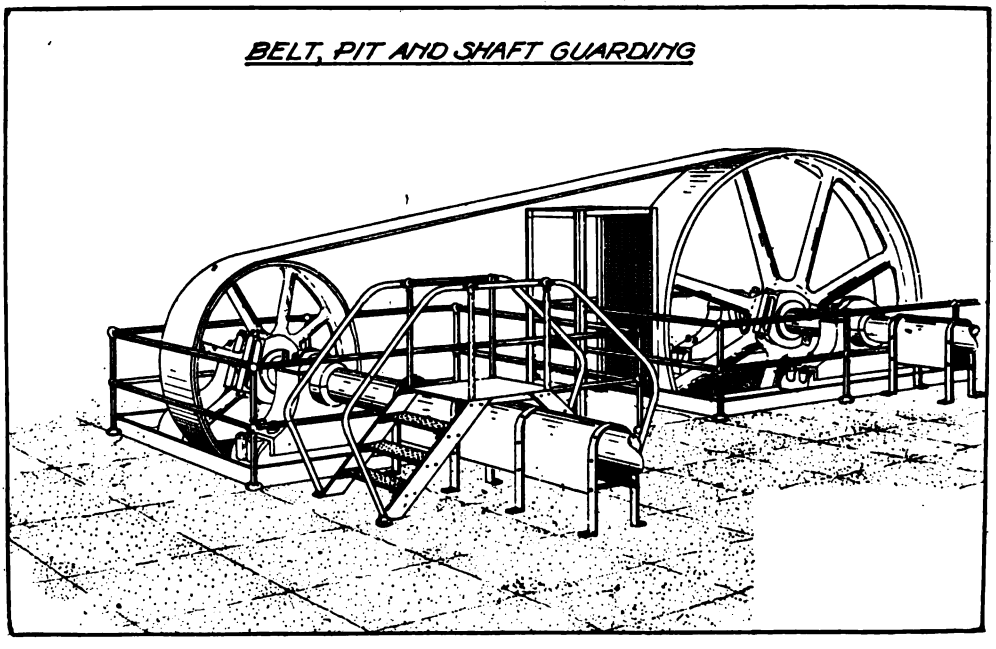
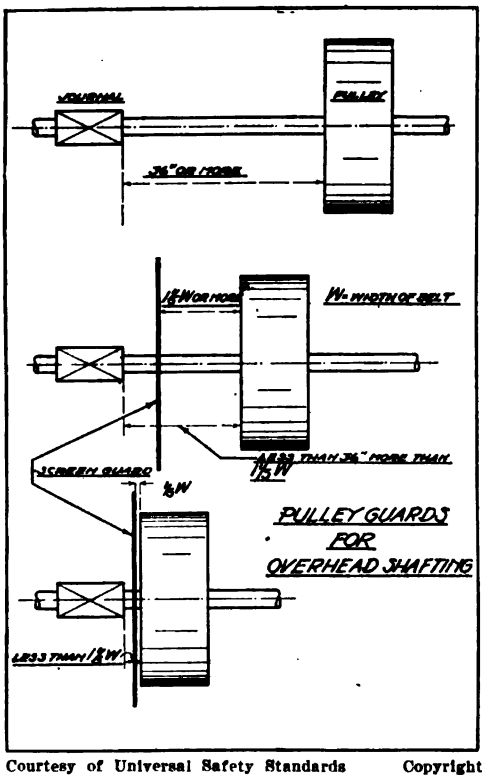
**Fig. 4.**




Courtesy of Universal Safety Standards. Copyright.

**Fig. 5.**




Courtesy of Universal Safety Standards Copyright

**Fig. 6.**

guarded, although according to these same statistics, two per cent less accidents occur on belts and pulleys than on shafting. Is this because the pulley and belt hazards are more obvious than those of the "snake-like" shaft? Scarcely probable.

Most workmen know that the friction of clothing against a revolving shaft quickly generates sufficient static electricity to wind it up, and the life of the man inside then depends almost solely on the strength of the cloth. The probable reason for scarcity of shaft guarding is the fact that most forms of shaft protection used to date have been extravagant of space, difficult to apply and, in the case of sheet-metal and angle-iron troughs, too costly. The mailing tube guard shown in Fig. 1, by courtesy of N. A. S. O., overcomes all of the objections mentioned and leaves no excuse why all exposed shafting should not be guarded. On a floor shaft it may be desirable to use a sheet-metal guard. The type shown in Fig. 2 has proven quite efficient. It is made of two half-cylinders of sheet iron fastened with a piano hinge and suspended from the shaft by pieces of spring steel.

Many good types of safety couplings and collars, on which the bolt heads or set screws are countersunk, have been on the market a long time, but attention is directed to the new type of couplings, with neither bolts nor set screws, presenting an entirely smooth surface. Two of these, one of which may be used for a hub bushing, are shown in Fig. 3.

Safety in belting should be studied from two angles: first, installation; second, methods of guarding. The ultimate tensile strength of belting does not enter as a factor in the calculations for the safety of belts. Kent states that the strength of the solid leather in belts is from 2,000 to 5,000 pounds per square inch, whereas, at the lacings or joint, even if well put together, it is only about 1,000 to 1,500.

The joint least liable to accident breaks is the well spliced and cemented joint. Taylor's "Rules for Belting" states that the splices for all belts up to 10 inches in width should be 10 inches long and above 10 inches the length of the splice should be equal to the width of the belt. Shops still using laced belts could reduce greatly the number of breaks by following these rules strictly. The stepping splice, coated with rubber and vulcanized in place, is best for rubber belts.

The second item to be considered for safety in belting, the guards, should conform to the following requirements:

1. Vertical and inclined belts should be substantially guarded as follows:

(a) If guard must be less than 15 inches from belt, with a complete enclosure, to a height of 6 feet. (Fig. 4.)

(b) If guard can be placed with at least 15 inches clearance from belt, with a standard railing at least 3 feet high. (Reference is to the standard railings, shown in February number.)

2. Horizontal belts to be substantially guarded as follows:

(a) If upper side is less than 6 feet from floor level or platform, to be completely enclosed on top and sides, or a standard railing at least 15 inches from belt to be provided.

(b) Where passageway between upper and lower sides of belt is necessary, standard railing to be provided and a substantial passageway guarded on sides and top to be constructed as shown in accompanying cut; otherwise, space traversed by belt to be completely barred against passage. (Fig. 5.)

(c) Overhead belts with lower side 7 feet or less from floor level or platform to be guarded on sides and bottom.

(d) All overhead belts 6 inches or more in width or travelling 30 feet per second, or faster, which are located more than 7 feet from floor or platform level to be guarded underneath.

Bearings on overhead shafting which require little attention, such as the ring oiling or chain oiling bearing, promote safety for oilers, and therefore they should be used in preference to the ordinary type. All pulleys on overhead shafting within 36 inches of bearing should, however, be guarded. The accompanying diagram shows an effective method of guarding such pulleys. (Fig. 6.)

## PROTECTION FOR CHIPPERS.

That the Southern Pacific Company realizes the importance of flying chips as a cause of accidents is indicated clearly in the accompanying pictures. In the repair of railroad equipment, such as switches, frogs, etc., and in the demolition of locomotives and railroad cars much chipping is necessary. The picture below shows a very effective type of screen, used in the yard.

Assuming it was not there, what would happen to the men handling the trucks and material in front of the chippers? Serious and even fatal injuries from such causes have been very frequent in the past. The wire netting in the screen has sufficient strength to prevent a rivet head from piercing it,

and it forms the cushion necessary to prevent the rivet head from rebounding on the chippers.

The second picture shows that the company realizes also the importance of protecting parts of the body likely to be struck by flying objects. Besides the goggles furnished, the men are wearing leggings to protect their lower limbs, exposed particularly when cutting up scrap in the manner indicated.

## INDUSTRIAL HYGIENE.

The work planned by the division of industrial hygiene, the bulletin of the Board of Health, New York City, says, depends for its success largely upon the recognition given to it by working people and manufacturers; also that the measure of benefit that is expected to accrue to the working people, through improved sanitary conditions, and the manufacturers, through enhanced efficiency of employes, should make the new division a welcome and desirable influence.

The commissioner has received letters from several manufacturers, praising the new field of work undertaken by the department and promising support. The Central Federated Union of Greater New York and vicinity adopted a resolution that endorsed the new work and promised support. The United Hebrew Trades decided to give to the division all the assistance possible.

# INDUSTRIAL ACCIDENTS IN PENNSYLVANIA

## MORE THAN 38,000 CASES, CAUSING WAGE LOSS OF MORE THAN $1,000,000—DISTRIBUTION BY INDUSTRIES.

INDUSTRIAL accident reports to the number of 38,126 were received by the Department of Labor and Industry of Pennsylvania in 1914. Commenting on the preliminary tabulation of the reports, Commissioner Jackson said: "It is hoped that the presentation of the facts will show the industrial establishments the necessity for earnest work in the accident prevention field and will suggest some lines along which it would be best to work. A careful study of the tables, as they are issued from time to time, will show certain classes of injuries which can readily be avoided. Others, it will be seen, can be reached in number by educational work carried out along this line.

"It is generally admitted that approximately 50 per cent. of all accidents can be avoided if every person concerned will do his utmost to prevent them. No doubt many people have not realized the enormous waste of time and money, and the accompanying suffering, which is occurring every month in this State because of accidents. A statement of the facts in concrete form is, therefore, important."

Particulars of the report:

LOSS OF WAGES.—During the past year, $1,048,503.96 in wages was lost to the employes of this State as a result of those industrial accidents reported. This does not represent the total loss of money due to accidents, as it does not include the loss to the employers. Whenever an accident occurs, considerable time is lost by all the members of that shop or department, due to the excitement of the

DISTRIBUTION OF INDUSTRIAL ACCIDENTS.

| Industries | Total to date. | Loss. Number of days lost. | Loss. Wages lost. | Number of dependents. | Cause. Defective equipment. | Cause. Lack of safeguards. | Cause. Careless methods. | Cause. Cause not given. |
|---|---|---|---|---|---|---|---|---|
| Nursery products—Plants and flowers | 7 | 28 | $147.40 | 19 | .. | .. | 2 | 5 |
| Engineering and laboratory service | 32 | 221 | 487.45 | 41 | .. | .. | 2 | 30 |
| Building trades | 749 | 5,552 | 13,918.10 | 1,145 | 2 | 1 | 47 | 699 |
| Chemical and allied products | 528 | 4,783 | 9,564.44 | 792 | .. | 3 | 69 | 456 |
| Clay, glass and stone products | 1,046 | 12,183 | 24,368.30 | 1,518 | 1 | 2 | 123 | 920 |
| Clothing manufacture | 55 | 565 | 996.59 | 34 | .. | .. | 3 | 52 |
| Food and kindred products | 275 | 2,875 | 5,693.30 | 249 | 2 | 1 | 29 | 243 |
| Leather and rubber goods | 201 | 1,977 | 4,044.10 | 194 | .. | .. | 44 | 157 |
| Liquors and beverages | 41 | 580 | 1,553.25 | 65 | .. | .. | 6 | 35 |
| Lumber and its remanufacture | 261 | 2,686 | 5,440.45 | 246 | .. | .. | 43 | 218 |
| Paper and paper products | 300 | 2,628 | 4,683.00 | 222 | 2 | 1 | 44 | 253 |
| Printing trades | 111 | 1,559 | 3,002.20 | 66 | .. | .. | 25 | 86 |
| Textiles | 386 | 4,184 | 7,230.00 | 245 | .. | 2 | 63 | 321 |
| Miscellaneous products | 309 | 3,294 | 7,172.85 | 388 | .. | 3 | 52 | 254 |
| Laundries | 17 | 237 | 595.40 | 8 | .. | .. | 1 | 14 |
| Metals and metal products | 18,932 | 225,372 | 547,025.62 | 30,796 | 47 | 47 | 2,989 | 15,849 |
| Mines and quarries | 681 | 6,302 | 13,104.15 | 1,244 | 2 | .. | 23 | 656 |
| Public service | 14,167 | 151,318 | 398,299.30 | 26,772 | 10 | 6 | 1,297 | 12,851 |
| Tobacco and its products | 18 | 356 | 883.66 | 16 | .. | .. | 4 | 14 |
| Unclassified industries | 10 | 124 | 294.16 | 16 | .. | .. | .. | 10 |
| Total to date | 38,126 | 426,824 | $1,048,503.96 | 64,076 | 66 | 66 | 4,866 | 33,123 |

The above does not include accidents reported to the Department of Mines or Public Service Commission.

accident itself. Also, it is necessary to replace the injured man, who may be skilled in his particular line, by some one who is less experienced. In this way the organization of the establishment is disrupted and production is lessened and costs are increased. Many manufacturers claim that the monetary loss to the industry is almost as great as that to the injured man himself. Accordingly, it can be justly assumed that the $1,048,503.96 given above represents only a part of the total monetary loss occasioned by the industrial accidents reported.

Loss of Time.—The reports received indicate that a total of 426,824 days were lost. Each person injured was unable to work for an average period of approximately 12 days. It must be borne in mind, however, that this does not represent the total number of days lost through industrial accidents, as the department does not receive reports of accidents which occasion the loss of two days or less.

Number of Persons Affected.—A study of the table will reveal the fact that 64,076 persons were actually dependent upon the wage-earners injured, so that in reality the income was temporarily taken away from 100,000 persons during the past year. In other words, one person out of very 77 living in this Commonwealth has been directly affected by these reported accidents.

Conclusion.—The above figures show the economic importance of industrial accidents, and it is hoped that their presentation will tend to awaken the interest of the public to the necessity of accident prevention work. It is believed that by a consistent effort on the part of every one concerned, this appalling number of accidents and monetary loss can be reduced.

## WARNING TO MOTORISTS.

The Long Island Railroad Company has inaugurated a campaign to induce automobile drivers to be more careful when driving over grade crossings on Long Island. At prominent points, where they cannot fail to be seen by persons in automobiles, it is placing big signs, of which the accompanying is an illustration. Some of the signs are to be 50 feet in length and 10 feet in height; others are to be 10 feet square. Several of them are to be lighted at night.

Not only will the company erect signs, directing the attention of motorists to the danger of driving recklessly over grade crossings; it will send out a series of bulletins.

The company is doing everything in its power to stop accidents at grade crossings, of which there are still 631 on Long Island. To date, 305 have been eliminated at a cost of more than $15,000,000. At the present time work on the elimination of 32 crossings is in progress.

Until grade crossings are done away with, railroad companies must do their utmost to prevent accidents at dangerous crossings, especially automobile and carriage accidents.

SAVE YOUR LIVES
THIS SIGN MAY SAVE YOUR LIFE TODAY.
All The Precautions In The World Will Not Save The
Lives Of Those Who Drive Automobiles Recklessly
Over Railroad Crossings.
When Approaching A Crossing Please Stop. Look. & Listen.
We Are Doing Our Part. Wont You Do Yours ?
LONG ISLAND RAILROAD.
SAVE YOUR LIVES

**Sign on the Long Island Railroad Bridge Over North Country Road, Broadway-Flushing.**

# NATIONAL SAFETY COUNCIL

*IN THIS DEPARTMENT ARE ARTICLES AND NEWS REPORTS CONCERNING THE NATIONAL SAFETY COUNCIL AND ITS LOCAL COUNCILS, FURNISHED EXCLUSIVELY TO "SAFETY ENGINEERING"*

## BOSTON COUNCIL.

MEETING on May 11 in the Walker Building, Massachusetts Institute of Technology; 100 members present.

CARE AND USE OF ABRASIVE WHEELS.—D. S. Beyer announced the subject for the evening—"The Care and Use of Abrasive Wheels." He referred to a committee of abrasive wheel manufacturers which had drawn up a safety code, copies of which were distributed. The record for Massachusetts during the past year showed 1,803 injuries in connection with abrasive wheels. Of these 1,151 were eye injuries, 605 cuts and abrasions, and 47 due to bursting wheels, two of which were fatal. The purpose of the meeting was to discuss means of preventing such accidents.

The first speaker was R. G. Williams, who has charge of the safety department of the Norton Company, Worcester. Mr. Williams was a member of the committee which drew up the safety code. In the course of his talk he showed several lantern slides, illustrating how various grinding wheel accidents occurred and how they might be prevented.

All kinds of wheels can be tested for cracks by tapping, with the exception of vulcanite and elastic wheels. The most common cause of accidents was rough handling on the part of the workmen in permitting objects to strike on the side or face of the wheel after received by the purchaser. Heating, due to excessive speed, was also responsible to a large degree.

The second speaker was Mr. Dietz, sales manager for the Norton company, who explained how the manufacturer of abrasive wheels endeavored to co-operate with the user in matters of safety.

Confidence in the product must be established by the manufacturer and the purchaser must be taught how to use the product. A campaign of education has been undertaken by the large manufacturers of abrasive wheels by sending inspectors to the plants of the larger users and distributing safety literature.

TESTS OF FINISHED WHEELS.—In the manufacture of a wheel everything from the raw materials to the finished wheel is inspected. All wheels of 5 inches in diameter and larger are mounted before being shipped and run at a surface speed of 9,000 feet per minute, which is four times the normal working speed. After the test the wheel is inspected and sworn affidavits are submitted by the inspector.

When it is borne in mind, Mr. Dietz said, that it is labor of a most ignorant class that is employed continually at grinding, the difficulty of the campaign of education will be understood. The spirit of "I don't care" must be broken down among workmen. When an emery wheel accident occurs the morale of the shop is impaired, the efficiency of the whole grinding room organization is cut down and other grinding rooms more remote are affected seriously.

Mr. Dietz received recently a communication from Sheffield, England, inquiring about an emery wheel accident in New York State, although it was not a serious accident.

The safety inspector should be edu-

cated as to how the best mechanical results might be obtained. Because a large emery wheel cannot be operated above a certain speed, it does not follow that smaller wheels cannot be operated in perfect safety at a higher number of revolutions per minute.

Consumers are giving more and more appreciation to the value of educating the workmen in matters of safety.

Mr. Rosseau spoke of the inspection work in the Norton Company's plant. A safety committee makes regular inspections monthly. There is also an inspector for each department, appointed from among the workmen, who is responsible for the conditions under his jurisdiction. Members of the research laboratories inspect all stands and wheels (40 in number) each week. The speed is taken and general conditions are noted.

A vote of thanks was then extended out of appreciation for the instructive talks.

The discussion:

Mr. Talpey.—Is any strain set up in a wheel while being tested at the factory?

Mr. Dietz.—This has never been found. The slightest crack in a vitrified wheel will dampen the ring after the test.

Mr. Talpey.—Do all companies manufacturing abrasive wheels make affidavits of their tests?

Mr. Dietz.—All companies make tests; but we are not certain about the affidavits.

Mr. Sanford raised a question as to the inconsistency of tables D6 and D12.

Mr. Dietz's reply was that they were merely to establish minimum dimensions.

Mr. Talpey offered the following formula for a safe speed of abrasive wheels:

$$R = \frac{125}{\pi D}$$

R = revolutions per minute.
S = surface speed in feet per minute.
D = diameter of wheel in inches.

Mr. Sanford.—Is not the value of .025 inches stated in paragraph D15 too small for leather, particularly on coarse wheels?

Mr. Williams.—I admit this is too thin for rubber and leather, but it is all right for blotting paper.

Mr. Beyer.—I know of a plant where all spindles are made 2 inches in diameter so that the wheels may be interchanged.

Mr. Williams.—The idea is an excellent one. Steel bushings are often used to fit over the smaller spindles. Large diameters for spindles are in the right direction for safety.

Mr. Sanford suggested another paragraph to be inserted in the code, which would require that the inside flange be a driving fit or keyed on.

Mr. Williams replied that it was now the practice of the leading manufacturers.

The question was raised if it was safe to use the side of the wheel for grinding.

Mr. Dietz.—We always advise against it. It is not wrong to touch up a light piece of work on the side of the wheel, but we emphatically oppose to turning a man loose to do what he wants in this direction.

Mr. Beyer suggested that the tool rest be kept close to the wheel to avoid jamming the work between the rest and wheel and called for comments in regard to the success of introducing goggles among workmen.

Mr. Kundert.—The Boston Elevated enforces this rule. Men are not allowed to work unless they use them, and the goggles are inspected about once a week.

Mr. Hawes.—Much trouble has been found at the Walworth Company, where the men steal the goggles as fast as they are supplied. They threaten to discharge all men hereafter who will not use them while at work.

Mr. Williams.—I know of a shop where the men, including the superintendents, wore goggles whenever they entered the shop. This had a great effect along the desired lines.

Mr. Rosseau.—At the Norton Company we had much trouble at first and induced a few of the workmen in each

department to wear goggles for ten days. We found that none of the goggles furnished were of the desired type. Since then a more desirable style of goggle has been adopted and the men are wearing them.

Mr. Talpey.- Do goggles cut down production?

Mr. Rosseau.—We do not find it so.

Mr. Beyer.—Different men apparently like different kinds of goggles, and it would seem well to supply a few approved styles for the men to select from. Do you know what type is best adapted for grinding?

Mr. Rosseau.—The goggles should have a light aluminum frame, with a screen guard at the side and between the lenses. The ear bow should be soft and the nosepiece adjustable. The side screen is quite desirable, particularly where wheels are installed side by side.

## PITTSBURGH COUNCIL.

MONTHLY meeting on May 21 in the rooms of the Chamber of Commerce. H. H. Robertson, vice president, acted as chairman and the secretary, Prof. G. W. Case, recorded the minutes.

COMMISSIONER JACKSON'S REMARKS.—Dr. John Price Jackson, commissioner of the Department of Labor and Industry, said that the State's laws relative to safety and welfare work had been strengthened by workmen's compensation and child labor laws. He indicated, in summing up the essentials of safety, that two points stood out prominently; one is co-operation between employer and employe and the other is "thinking safety at all times." He directed attention to the fact that the fire escapes on most of the buildings in the State are of the light, flimsy kind. As they pass by windows glazed with plain glass, they form very unsatisfactory means of egress at a time of fire or when people are seized by panic.

According to Dr. Jackson's view, the best fire protection in a building is the fire wall, which allows horizontal movement during fire and protects one half of a building for a time long enough to permit the occupants to vacate it by regular paths.

SAFETY APPLIANCES.—C. B. Auel, chairman of the standard appliance committee, submitted a report on the committee's work. Showing about thirty lantern-slides of appliances built by members of the local council and used in their plants, he said that working drawings of the appliances could be secured from the company using them, the cost to be only that of blue-prints. The report caused considerable discussion, many of the members being interested in the safety appliances.

## GRAND RAPIDS COUNCIL

MEETING on May 4. R. K. Merrill acted as chairman and the secretary, E. A. Meves, recorded the minutes. About twenty-five members were present.

E. K. Prichett, president of the council, opened the meeting with a few remarks relative to the annual meeting of the National Safety Council in Philadelphia in October. He said that in a conversation Mr. Campbell, president of the National Council, expressed the desire to have a goodly representation of Grand Rapids people at the meeting. At present the metal industry is the foremost in the accident prevention movement, nearly all of the officers of the National Council being in that industry. For that reason Mr. Campbell was particularly desirous that the woodworking industry make a showing at the meeting. He wishes the Grand Rapids Council to submit suggestions for discussion. Mr. Prichett informed him that the council would be pleased to comply with his request and he suggested to the members of the local council that they give the matter some consideration.

Mr. Merrill told how Germany had been making safety devices for the past twenty-five years, but is not so far advanced in accident prevention as we are, owing to the fact that the employers have not given much attention to the education of their men.

INSTRUCTION OF WORKMEN.—In connection with the education of employes, the first subject for discussion

was: "Do You Prevent Accidents by Instructing Workmen Regarding Dangerous Practices?" Mr. Porter, of the Porter Machinery Company, said that their plant was small and they made very few changes in their men. They start with apprentices and educate them from the beginning, teaching the boys the hazardous places before they allow them to do anything. The boys are shown how to do their work and the things to watch out for when working on the different machines. In twenty-five years they have lost only two fingers, and those through carelessness.

Mr. Doerr, of the Grand Rapids Brass Company, said that their methods were about the same as those followed by Mr. Porter. The boys are put on with experienced men and educated to the different hazards. In the press room they endeavor to get older and experienced men. The accidents in that department have nearly been eliminated during the last four years.

ACCIDENT PROMPTED PLACING OF GUARDS.—Mr. Thwing, of the Grand Rapids Veneer Works, said that their plant was not so hazardous as was generally supposed. It was true, however, years ago, when their vats were unguarded. They had more accidents then, due to the stubbornness of the superintendent in not having the vats guarded. He lost his life in the second accident, which hazard Mr. Thwing had previously explained and warned him against. In the accidents three men were killed. The head sawyer slipped into the vat and dragged his helper in. The superintendent went to their assistance, and he was also drawn in. After the accident they immediately guarded the openings with iron pipe railings and have not had a serious accident since, this fact showing that safeguarding would have prevented the previous accidents.

Since that time they have had the usual number of minor accidents, but within the last two or three years, they have gone thoroughly into the safeguarding proposition to minimize accidents as much as possible. They employed a man who made a study for months of safety devices and installed many of them. They went further, and, with the assistance of the insurance inspector, they put in every guard he suggested. Recently the inspector of the Michigan Manufacturers' Mutual Insurance Company remarked that the Grand Rapids Veneer Works has the best guarded factory that he had ever inspected.

Mr. Thwing said that they had made only a beginning in this work. He believes that the real safety is in educating the men to take care of themselves. In connection with the necessity for educating the employes, he cited an accident which occurred in the factory about a week previous. The employe was 68 years old, and he had been with the company twenty years without an accident. He cut off one finger and was talked to severely by the superintendent, but two hours later he came down minus another finger. Mr. Thwing said that they avoided employing men who could not speak the English language and could not be talked to intelligently.

Mr. Mosher, of the Kindel Bed Company, said that the foreman in their factory had been given instructions to warn every man of the dangers of his work. The instructions were prompted by an accident recently in which a man lost his hand. The man was injured in spite of the precautions.

Mr. Gormeley, of the American Seating Company, was of the opinion that whistling, loud calling, etc., should not be allowed in a workroom. Anything that detracts a workman's attention from his work is likely to cause accidents.

DANGEROUS PRACTICES.—Mr. Meves said that men would do things unconsciously, not knowing that they were dangerous practices, such as scuffling around machinery, riding slow-moving conveyor belts, throwing blocks, etc. To instruct the men along, he called a meeting, pointed out the dangerous practices and showed how it was impossible to provide any guards for them. He put the proposition up to them in this way: If they were willing to refrain from the practices, the com-

pany would make proper expenditures for any guards that were necessary. The results were astonishing; practically all of these dangerous practices have ceased. The safety bulletins have kept the things before the men and the foremen are alive to the subject. Mr. Meves said that an iron-clad rule was that every new employe must be instructed as to the hazards and dangers around the factory, especially in his particular work.

Mr. Doerr said that they had more men injured by falling down stairs than any other way. When the whistle blows at noon or night, the men get up and run, and in the rush, going down the stairs, they frequently fall and injure themselves. The practice is done away with by having a watchman at each floor to see that the men go down the stairs single file and in an orderly way.

Mr. Bates, of the Grand Rapids Veneer Works, said that he had the hardest fight in his life to get his men to leave the factory without going out with a wild rush. He conquered the tendency by discharging ten or twelve of the men.

Mr. Merrill stated that they were troubled also by men who rushed madly out of the factory at night. They have taken steps to stop it, but have not succeeded wholely yet.

ACCIDENT PUBLICITY.—The second subject for discussion was: "Do You Give Publicity to Accidents Which Have Happened?" Mr. Merrill said that we should differentiate between publicity and notoriety. When newspapers pick up news of an accident, which is not at all serious, and enlarge upon it to make a big thing of it, they do not particularly help the cause, but do hurt the company in whose plant the accident occurred. He said newspapers give publicity to accidents that cannot be prevented by guards. Some of the men concerned in the accidents do not like publicity by bulletins, but it is given nevertheless.

Mr. Prichett related the particulars of an accident which recently occurred in the Macey Company, causing the death of one of the oldest employes. The man's death resulted from a slight scratch, which became infected and developed into blood-poisoning. The fact that the death could have been prevented by merely having the wound attended to immediately caused the company to give wide publicity to it around their factory. Bulletins were printed, and, besides being placed on the bulletin boards, one was placed in each pay envelope. The cases of infection are bound to occur unless prompt attention is given to all minor cuts and bruises.

PHYSICAL EXAMINATION OF WORKMEN.—Mr. Thwing was of the opinion that all factories should make examinations of their employes before hiring them. He has cause to believe that several of the cases of infection are caused by the presence of venereal diseases in the bodies of the employes. As soon as these men are scratched or bruised in the slightest way, the condition of their blood causes immediate infection. He cited an instance in his factory. The man got something in his eye. The irritation caused by removing it developed into infection on account of the condition of his blood, and the result was that he lost the sight of the eye.

Mr. Prichett said that the foremost concerns in the country were having examinations of their employes.

Mr. Doerr stated that the National Cash Register Company was particularly severe in this regard. His personal experience in going into the employ was that it took him two days to get through medical examination and the submission of reports.

Contrary to the experiences reported by others, Mr. Mosher stated that, out of 200 accidents on their spindle-carver, the only case of blood poisoning was experienced by a man who had the services of a physician. Ninety-eight per cent of the men took care of themselves and no serious complications resulted.

UNSANITARY CONDITIONS.—The third subject was: "What Are You Doing to Prevent Loss Due to Unsanitary or Dirty Conditions?" Mr. Merrill inquired of Mr. Meves if any of the men

had lung trouble on account of the fine dust in the work. Mr. Meves replied that they have men who have been in the employ for 17 or 18 years, and they are just as sound as ever. The dust does not seem to be injurious.

Mr. Richardson, of the Macey Company, said that they had a committee which went around once a week and inspected conditions. Those needing attention are looked after properly.

Mr. Merrill stated that foremen were required to look after the toilets and fire barrels, but they sometimes neglect them.

W. S. Rowe, of the Valley City Milling Company, said that he has found it well to paint the toilets white every six months. If a place is white and clean, the men will endeavor to keep it so; if it is dirty, they will keep it in the same condition. This is a characteristic of the human nature.

Mr. Meves suggested the advisability of appointing a committee to take up with the Grand Rapids Street Railway Company the matter of having a bulletin board built at Ramona Park. Mr. Prichett thought the proposition was worthy of consideration.

Mr. Meves said that officers of the council were always on the lookout for topics for discussion. He thought that several of the members might have in mind subjects that they would like to discuss, and it would be of great help if they would pass the subjects along for discussion at the round table meetings.

## NEW YORK COUNCIL.

MEETINGS are not to be held until the fall. In the meantime the members of the executive committee are to be busy with many tentative plans to broaden the scope and usefulness of the organization.

J. L. Murrie, chairman of the membership committee of the council, having resigned, his successor has been elected in the person of Roger W. Straus, of the American Smelting & Refining Company. The executive committee of the council is gratified that Mr. Straus has agreed to take up the work, and feels that, with his assistance, the New York Council will enjoy a large increase in membership within a reasonable length of time.

The council has now 99 members in New York City and vicinity, some of whom, of course, have more than one representative each, and special efforts are being made to increase the number materially prior to the fourth annual congress of the National Safety Council in October.

## BALTIMORE COUNCIL.

UNDER the auspices of the council a successful and enthusiastic safety meeting was held on May 27 at Sparrows Point for the benefit of the 5,000 employes of the Maryland Steel Company. The motion picture theater was engaged for the evening, and it was packed to the doors.

How to Prevent Accidents.—The principal speaker was Dr. Francis D. Patterson, director of the department of sanitation and accident prevention, Harrison Brothers & Company, Inc., Philadelphia, and president of the Philadelphia Safety Council. His subject, "How to Prevent Industrial Accidents," was illustrated by slides and motion pictures. He began with a brief outline of accidents and accident statistics and then took up in the various phases of safety work from the viewpoint of steel mill operatives.

Among the films projected was one based on a scenario written by Dr. Patterson, showing the most approved types of safeguards for various classes of machinery the treatment of injuries, etc. Another reel showed the right and the wrong methods in fire prevention.

The Maryland Steel Company occupies a prominent place among the industrial concerns of Maryland that are carrying on systematized safety campaigns, and T. W. Stingley, who has charge of accident prevention matters, is arranging with the local council to have a meeting of women and children at Sparrows Point in the near future.

A meeting of the local council is

scheduled for an early date in June in the Y. M. C. A. Central Building. The addresses are to be by Mr. Jensen, vice president of the council and Mr. Harris, of the Maryland Steel Company, followed by a round table discussion of matters of interest.

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## PHILADELPHIA COUNCIL.

MEETING on May 18 in the rooms of the Engineers' Club. The president, Dr. Francis D. Patterson, acted as chairman and the secretary, Charles C. Black, recorded the minutes. The speaker of the evening was Marcus A. Dow, general safety agent of the New York Central Lines. His subject was "Safety and the Human Element."

THE TWO ELEMENTS.—In his reference to safety organizations in industrial plants, Mr. Dow mentioned the two elements that presented themselves for solution: First, the mechanical element, involving mechanical safety devices, and, second, the human element, or the unsafe practices and carelessness of employes. The mechanical element is apparently easy to overcome; but to eliminate effectively unsafe practices requires long and earnest work on the part of all parties concerned to secure proper co-operation. The little things cause more accidents than the big ones. Statistics of the New York Central Lines show that only 9.65 per cent of their accidents was caused by defective appliances, tools, etc., while the great bulk was due to carelessness.

CARELESSNESS AT CROSSINGS.—Mr. Dow denounced the crime of carelessness that has gripped the American public, and he explained the check kept on three railroad crossings between the hours of 7 a. m. and 7 p. m., showing that, of the 7,779 persons that crossed the tracks, only 359, or less than 5 per cent, looked both ways before crossing.

He gave the detail of the safety campaign of the New York Central Lines. A man was assigned to travel over the entire system and stop at every station to educate the public in safety. The subject was taken up with the judiciary, newspapers and schools of each community; and the seriousness of the situation so appealed to the interests that their co-operation was secured.

An appeal was made to the school authorities to impress the children with the importance of safe practices. When they were told that 1,400 children under 14 years of age were killed each year on the railroads, they became active for "Safety First." The campaign produced a reduction of 19 per cent in the tresspassing accidents the first year.

EDUCATING EMPLOYES.—An effective means of educating employes is centered in the use of a lecture-car, which travels over the lines. Lectures are given to all employes in the company's time. They are told that it will take no more time to prevent 96 per cent of their fatal accidents than it will take to make out reports on the happenings, and that accidents to the extent of 97 per cent are caused by small things.

A difficult railroad problem is to stop short cuts across tracks. The habit prevails principally about industrial establishments. It is an enormous problem, when it is taken into consideration that 5,000 people are killed each year through the curse of chance-taking.

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## YOUNGSTOWN COUNCIL.

MEETING on May 18. The vice-president, F. J. Warnock, acted as chairman and N. W. Kistler recorded the minutes in the absence of Secretary J. M. Woltz.

It was intimated that the committee appointed to report on "What is a Reportable Accident?" would submit soon its revised findings.

Mr. McMasters, chairman of the committee on portable boilers, intimated that the committee recommend the adoption of the boiler code issued by the American Society of Mechanical Engineers; whereupon it was resolved unanimously that the Youngstown lo-

cal council endorse the code, and that the adoption of it be recommended to the State.

Mr. Frazier having intimated that several unguarded machines were in the South High Manual Training School, it was decided to bring the matter before the proper authorities, with the object of applying the proper remedy.

## LEHIGH VALLEY COUNCIL.

BI-MONTHLY meeting on May 14, in the main dining room of the Nazareth Inn, Nazareth, Pa. The members were the guests of the Nazareth members, the places being for fifty at dinner.

NEW COMPENSATION ACT.—Two attorneys, R. S. Taylor, of Bethlehem, and Elmer King, of Dover, were the speakers. The subject for discussion was the proposed workmen's compensation law for Pennsylvania. Mr. Taylor took up each section and explained how they would affect the various industries in regard to accidents. The general working of the law was explained in detail and the methods of protective insurance were taken up in order, as set forth in the tentative drafts. Mr. Taylor said that he considered the proposed act a very good one and that he believed its passage would react for the greatest general good.

OPERATION OF NEW JERSEY LAW.—Mr. King explained in a general way how the compensation law of New Jersey worked out. In many respects the proposed Pennsylvania law, he said, is like the law in operation in New Jersey, and it is conceded generally in the State that the results attained have been gratifying. The law brings employer and employe closer together. The "ambulance chaser" has been eliminated entirely and the orderly regular manner in which all settlement are being made is of the greatest benefit to all employes, in that the financial aid, so often needed at once, is available immediately, and much unnecessary litigation in the courts has been practically obliterated.

Mr. King explained the value of compensation laws to the employer, in that he was able to figure the amount of money necessary to cover his miscellaneous accident cases over a given period.

Many of the members asked the speakers to explain certain specific points in the proposed new law.

ACCIDENT REPORTS.—Mr. Sweetser, president of the Thomas Iron Company, had some interesting statistics that pertained particularly to the proper reporting of accidents. It was said that, in the January bulletin of the Department of Labor and Industry of Pennsylvania, certain figures indicated certain kinds of work to be far more hazardous than they were really. The false impression, it was suggested, was due to the careful reporting of accidents in the industries on the one hand and the lack of reports from most of the others on the other hand. The point was made also that a fair comparison of the hazards in any industry could not be shown unless the figures were based upon the number of persons exposed to the hazard, which might be on a basis of so many accidents per 1,000 employes or some such similar calculation. The figures of the Department of Labor and Industry were not calculated on any such basis and therefore it would hardly be fair to draw conclusions from the statistics given in the bulletin referred to.

## CHICAGO COUNCIL.

MEETING in the rooms of the City Club on May 25; about 175 present. H. J. Bell, president, acted as chairman. The minutes were recorded by E. L. Schnadig in the absence of Secretary A. W. Hitchcock.

Motion pictures were shown, depicting tests of fire prevention equipment, etc., at the Underwriters' Laboratories, Inc. The reels were explained by J. E. Latta, special agent of the laboratories. These pictures gave the spectators an insight of the exhaustive manner in which the tests are carried out.

The pictures were followed by a round table discussion, at which A. H. Young presided. The first topic was "The Value of Safeguards." M. E. Arkills, of the

Pullman Company, spoke at length, illustrating his points by lantern-slides. The relative value of safeguards still remains a mooted question.

The second topic was "Why the Workmen Should Be Interested in Accident Prevention." Mr. Young vacating the chair in favor of Alexander Shane. C. A. Gilkerson, safety engineer of the Public Service Company of Northern Illinois, began the discussion, and it was continued by several gentlemen.

Peter M. Hoffman, coroner of Cook County, Ill., was to have made an address on "Public Safety," but he was called away on urgent business just before the meeting opened.

## COLUMBUS COUNCIL.

THE recently-organized council had successful public safety meetings on May 27 and 28 in the auditorium of the Chamber of Commerce. In order to give initial publicity to the sessions, a large poster, furnished by the Columbus Railway Tower & Light Company, was suspended across the principal street at a busy corner and printed posters were displayed in street cars; and the newspapers, which carried each day of a week a notice of the meetings, calling upon the people to attend the meetings, had a cartoon for each of the notices. May 27 was termed "Industrial Safety Night," and the factory employes had been urged to attend the meeting. Unfortunately the weather was bad, but 500 persons were present.

President F. G. Bennett opened the meeting, outlining the aims and purposes of the local council, and concluded by reading a letter from Governor Frank B. Willis, a member of the council, regretting his inability to attend the meeting and expressing his best wishes for the success of the cause.

SAFETY WORK IN THE STATE.—The first speaker was Victor T. Noonan, director of safety of the Industrial Commission of Ohio, who outlined the safety work to be carried on in Ohio and discussed the work accomplished. He brought the subject home to his audience when he said that his point would be more forceful if the 80,000 men and women who were injured or killed in Ohio factories in 1914 might walk across the stage. In declaring that safety work, outside of religion, is the greatest movement of the age, he dwelt upon the "human factor" in accident prevention work, and said that, while machines were seldom the causes of accidents, 70 per cent. of the casualties were due simply and solely to carelessness.

T. J. Duffy, of the Ohio Industrial Commission, who has charge of the compensation work, indicated that while it was a great thing for the State to compensate the dependents of men killed in factories, or to indemnify a man for the loss of a limb, it was a much greater work to save a life or save a limb. Ohio is back of the safety movement, and tremendous results are to be shown in a few years, possibly a reduction of 50 per cent. in the present toll of accidents, if the people will do their share.

Musical selections were rendered by the Jeffrey Choral Society of fifty voices and orchestra. The motion pictures were "The Crime of Carelessness," the Eastman Kodak Company's reel, "Fire Drills," and "An American in the Making."

INTERESTING THE PUBLIC.—The second meeting was announced as for the public and 800 persons were present, despite continued unfavorable weather conditions. Mayor George J. Karb presided. S. G. McMeen, president of the Columbus Railway Power & Light Company, and of the Ohio State Telephone Company, spoke of the attitude of public utilities companies toward safety matters. He said that the United States, being a young nation, with tremendous resources, had been very wasteful, and that with the wonderful movement to economize such resources came the safety movement, which springs from the heart. He indicated that the reason the safety movement had been so successful, and was growing so rapidly, was that it was founded upon the Golden Rule, "Do unto others as you would have them do unto you." Touching upon lines of co-operation between the public and public utilities companies, Mr. McMeen said that his company was doing everything in its

power to instruct employes to be careful, and asked for the co-operation of the people who use street cars.

Superintendent Shawan, of the Columbus public schools, declared it was possible the schools were not doing enough for safety, and that the teachers might spend some time each week in educating pupils to be careful. He placed on record his hearty co-operation in the safety movement, and said that he would do all in his power to help. "We read the sign 'STOP, LOOK and LISTEN,'" he said; "but this should be supplemented by 'THINK.'" He concluded by saying that the man who took time to think very seldom got into a dangerous position.

CO-OPERATION OF AUTOMOBILISTS.—President C. M. Kinnaird, of the Columbus Automobile Club, said: "Automobilists are now looking upon safety work with greater interest, and already are displaying some educational activity." He read a list of ten "Don'ts" from an *Automobile Magazine*, and intimated that his club had sent the list to its members. He directed attention to the fact that his club had placed "DANGER" and "GO SLOW" signs at dangerous crossings and near the schools, and he concluded by saying: "The man who drives an automobile is vitally interested in the safety movement, and my club will in every way aid the work of the Columbus Local Council."

Victor T. Noonan spoke again. He told of going into the schools in a certain city and having the children who had lost parents through accidents hold up their hands. "In every room several little children held up their hands," he said.

He continued by telling his hearers that the records of the Ohio industrial commission for the past year prove "that the hands—the most useful members of the body—suffer most in accidents; and that one out of every fifteen cases of compensation came from an infection which developed into blood-poisoning from the lack of proper treatment at the beginning." Quoting statistics, he said that, if applied to the audience, one out of every ten of those present would be killed or injured in the coming year.

During this second meeting music was furnished by the Ohio State University Mandolin Club. Motion picture films were projected also. At both meetings safety exhibits and bulletin boards were on view in the lobby of the auditorium.

The officers of the council have planned to have more of the meetings.

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## ROCHESTER COUNCIL.

MEETING on May 25; about 175 present.

President J. A. Robertson outlined for the benefit of those present who were not at the previous meeting the plans for the organization of the Junior Safety Council within the Rochester Chamber Safety Council.

The programme was for a round table discussion on how to gain co-operation from employes, general housekeeping in the plant, inspection and maintenance, and general subjects. The discussion was begun under the chairmanship of J. C. Parker, of the Rochester Railway & Light Company, but time did not permit the taking up of more than two of the topics.

A representative of the Rochester Stamping Company said that cheap, becoming caps were worn by female employes near machinery likely to draw the hair into cogs and exhaust-systems. The caps cost about five cents each, and the liberal use of ribbons removed whatever objections the employes had to wearing them.

A representative of another company explained that a revolving shaft in a machine might be guarded by tying on a piece of waste where it could be seen by those in the vicinity.

Mr. Parker announced the discoverey by his company that oil used in cutting threads on pipes in automatic screw machines was often a veritable culture ground for germs that infect cuts and small scratches on the hands. He indicated that all such oil should be sterilized.

President Robertson then introduced Marcus A. Dow, general safety agent of the New York Central Lines, who spoke on "Safety First and the Human Element."

## SAN FRANCISCO COUNCIL

PRESIDENT J. R. Brownell piloted the charter members successfully through a year of work. At the annual meeting on May 25, in the office of the president, the following named officers were elected to take up the active duties:

President, V. R. Hughes, safety engineer of the Pacific Gas & Electric Company.

Vice President O. J. Smith, manager of the San Francisco branch of the San Francisco branch of the Workmen's Compensation Service Bureau.

Secretary and Treasurer, G. E. O'Neil, casualty underwriter of the Pacific Coast Casualty Company.

W. H. Cameron, secretary of the National Safety Council, has been entertained by the local council. The members of the council are looking forward to the visit of R. W. Campbell, president of the National Council.

The members of the local council have been interested in the traffic regulations for jitney buses.

## READING COUNCIL.

TO EMPHASIZE the importance of observing "Safety First" rules in every walk of life, a strenuous educational campaign was conducted during the week of May 17-22 in Reading, Pa., by the Reading Chamber Council. Through co-operation on the part of the school authorities arrangements were made to reach the 14,000 school children.

Three motion picture reels, teaching safety lessons, were secured and shown to the school children. Most of the performances were in the auditoriums of the largest school buildings. the machine being shifted from one building to another. The pictures were shown 33 times. At each performance an address was delivered by Rex D. Billings, claim agent of the Reading Transit & Light Company and chairman of the committee on public safety. One feature of the campaign was that each child took the pledge of the safety patrol.

The campaign culminated in a large mass meeting in one of the public halls. The public was invited to attend. Tickets of admission were supplied to all the large industrial plants of Reading for distribution to the employes. Industrial and public safety features were emphasized.

The meeting was presided over by Joseph S. Pendleton, president of the local council. Addresses were delivered by Lew R. Palmer and Charles T. Miley, of the State Department of Labor and Industry, and Mr. Billings. Members of the Reading Local Moving Picture Exhibitors' League contributed largely by their co-operation to the success of the campaign.

The Reading Chamber of Commerce is planning other activities along education lines. Follow-up work will probably be done among the school children at the opening of the schools next fall, expecting to further enlist the children in the safety movement by the distribution of buttons.

## SYSTEMATIZING SAFETY DEVICES.

When the committee on the prevention of industrial accidents reported at the annual convention of the National Metal Trades Association recently, it asked for suggestions from the members, from time to time to further the systematizing and standardizing of safety devices. The safety inspector of the association, William H. Doolittle, reported that he had visited 350 plants in 300 cities in the past year. He said that the chief benefit of the trips "was a larger acquaintance with new safety devices and appliances than could be obtained in any other way; that each plant was pretty likely to have one or more safety features in which it excelled, and the sorting out of these 'best' features and their application to similar conditions in other plants had been of decided advantage." The best results were to be found where special safety committees were maintained, and he recommended that such committee be appointed at all plants.

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No movement in recent years has gained such hearty endorsement and encouragement as "Safety First."—*Scranton Times.*

# "THE MAN ON THE JOB"

*COMPETITIVE ARTICLES RELATING TO THE PREVENTION OF INDUSTRIAL ACCIDENTS BY EDUCATION OF WORKMEN, METHODS OF MANAGEMENT AND MECHANICAL SAFEGUARDS*

**No. 171** THE USE OF PHOTOGRAPHY IN SAFETY WORK.—The most unique method of working for safety in all walks of life is through photography. A picture will attract the attention of the human element more so than volumes of literature that may be posted on bulletin boards of industrial plants, as well as in commercial establishments, offices, public buildings, schools, etc. A good example of this statement is that, when we pick up a daily paper, if there is a picture in view our first impulse is to look at the picture before we begin to read the printed news.

What better means could be devised to interpret the cause and remedy of any given accident to those whose safety and welfare is at stake than by placing on the bulletin boards and other convenient places pictures showing how the accident occurred and also a picture showing how the accident could have been avoided?

It seems to be the custom in most industrial plants to post on the bulletin boards notices of all accidents that occur in and about the mills. These notices are not always lucid to the average employe, who in most cases can not read English or his own language. Much is wasted each year on such notices and pamphlets and books, giving all kinds of statistics of the causes of accidents. This literature is very seldom read by the employes in industry. If, on the other hand, they were furnished with pictures, the results would be very noticeable in the cutting down of the so-called unavoidable casualties. For an example of the use of photography, we will say that an accident occurred by the injured party running a nail in his, or her, foot by coming in contact with a protruding nail in a piece of board that had been placed carelessly. How easy it would be to show by means of a picture just how the accident occurred, and at the same time show how the suffering of an employe could have been avoided.

These pictures could be posted in different parts of the mill, and a better idea would be to have the pictures reproduced on both sides of the employe's weekly pay envelope. Each week different pictures of accidents could be used. The pictures would indicate accident prevention for each man and good results would be had at very little expense.

How much better it would be for an inspector, when inspecting the smaller factories, as well as the larger ones, to say to a manufacturer, "Here is a picture taken in Mr. Jones's mill of a guard on a machine like the one you have. If you will guard your machine in the like manner, it will be the means of saving dollars and cents."

The writer refers to photographs, not sketches, drawings, etc., that are no more than some person's ideas of the ways guards should be made; they don't go. It is necessary to show the manufacturer a guard that is in practical use.

The writer has been interested in safety engineering about ten years, and his best results have always been through photographs in demonstrating to the manufacturers the use of safeguards. Where talks and sketches will convince one man a picture will get ninety-nine.

In conclusion, I am not in the market to sell cameras. I wish merely to give my experiences to all who may be interested in safety work, possibly to be bene-

fited as I have been benefited by the numerous articles in the department of "The Man On The Job."

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**No. 172** SAFETY EDUCATION.—From my point of view, the most essential thought of "Safety First" is Safety Always; and to attain this it is necessary to adopt a plan of organization. Without organization coupled and allied with education, safety would not thrive.

The subject of educating the workmen embraces so much that I shall confine myself at this time to one phase of the work, namely, that of conducting systematic talks directly to the workmen, so that they may know the plan is a mutual protection. It should be mentioned, however, that lectures to the foreman are most essential in creating the safety spirit in a plant.

A very successful feature of safety education is the appointment of a man who, in connection with his regular work, is known as the "department safety man," one man in each group or gang being selected by the foreman. To illustrate this, let me take, for example, a department as large as one of our departments, where a man from each of the cupolas, mixers and vessels, and from the pouring stand, muller house, sailors, blowing engine room, etc., is appointed. It is the duty of this man to report the violations of safety rules and the dangerous practices, also to assist the foreman generally in helping to eliminate accidents. The plan at first did not appeal to the men, the idea prevailing that they would be considered as "knockers" by their fellow-workmen, and reports from them were not very numerous.

To increase the interest and authority of the safety men, it was decided to have each wear a distinguishing emblem; and, to create further enthusiasm, a prize was offered for the best design for a department safety button. This added considerable interest and many valuable suggestions were received. A one- and three-quarter-inch button, with a red central circle—the universal danger signal—surrounded by a blue circle one-quarter of an inch in width, bearing the words "Department Safety Man" in white letters, was adopted. Each button is worn in a conspicuous place.

Results from the men were still rather unsatisfactory, and it was thought the plan could be benefited materially if meetings were held. Accordingly there have been assemblies once a month, the meetings lasting from one-half to three-quarters of an hour. Departmental records and comparisons with previous records, accidents occurring during the month, monthly discipline reports and the means of eliminating inconveniences are standard subjects. In discussions important subjects—efficiency of the man, liquor and its effect on the human system, fights, carelessness, unsanitary conditions, profanity, etc.—will evolve.

Experience has proven that it is advisable to change these men at least once in three months to allow as many men as possible to acquaint themselves with the details of safety. Non-English speaking men are instructed by the plant interpreter, who teaches the ignorant foreigner, not only regarding his own safety, but that he is "his brother's keeper."

These meetings are closed with an oral examination in the department safety rules, each man examining another. No book is used. It is amusing to note the friendly contest among the men, who seem to enjoy "putting one over" on their side partners for misapplying a safety rule.

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**No. 173** ELIMINATE THE "HORSE PLAY."—If there is one cause of injuries, for which the officials of a company should feel heartily ashamed, it is "horse play." By "horse play" is meant the playing of practical jokes by the men upon each other, or fooling with each other. That such joking does occasionally result in injuries, sometimes of a serious nature, we all

know; and that the officials should be ashamed of this cause for injuries is also true for proper discipline will eradicate it.

There are many kinds of this joking. Every plant, and every department in every plant, has its pet jokes. These, the men endeavor to play upon the green and innocent hand. A few are: Throwing of waste and other articles, asking the new man to pick up hot articles, wrestling and tripping, fooling with the electric current, etc.

The following incident came under my observation: Two young fellows were wrestling on an iron floor in working hours, with the result that one was thrown violently to the floor, his head striking first. The man, however, went back to work. About an hour afterward, the foreman noticed him, acting queerly. He was walking around aimlessly and staring into space. He could not talk coherently, and his eyes failed to respond to the stimulus of a light flashed into them. He was hustled to the doctor. The doctor pronounced it a slight concussion and ordered the man to the hospital. There he recovered under proper treatment in twelve hours.

What was the loss to the company? The company lost its return on its investment in the two offenders, who were discharged. Substantial bills from the doctor and the hospital were paid by the employer.

The incident is one of many that are daily happening. Recently the papers of Pittsburgh recorded a death that resulted from a practical joke. Of course, the fellow who threw the lighted waste never thought of the sleeping man's oily clothes and the possibility of injury and death.

Another time I observed a boy, who was tripped, come within a few inches of having his arm drawn in between a large belt and pulley.

There are times and places for fun and good-natured, harmless jokes; but a well-filled industrial plant, where there are dangerous machines in motion and smooth and hard floors, is no place for anything but careful attention to business.

How would you eliminate this danger? By strict discipline. See that every foreman distinctly understands that no fooling or practical joking will be tolerated. Make it a part of the company's bulletined rules of order. Point out to the foreman the inherent danger in such actions. Tell him the benefit of your own observations along this line. Draw out of him his own experience. Almost every time, if he has been employed very long, he can and will tell you of some accidents or hairbreadth escapes due to joking and fooling which strict discipline would eliminate. With all foremen on the lookout for anything in the line of joking, the danger will soon cease and the conduct of the men will improve.

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**No. 174** REPORT SLIGHT INJURIES AND AVOID BLOOD POISON.—One of the biggest problems of the employer is the prevention of blood poison from the neglect of small injuries. The workmen, generally, do not report slight injuries, and, as a result, in a great number of cases severe infection sets in. We have been very successful in combating this condition by impressing on each individual workman the rule, "If you are injured, no matter how little, tell your foreman about it right away and go to the doctor. A slight injury may cause blood poison." We found that even after this rule had been impressed upon the workman, some failed to report slight injuries and blood poison resulted.

To line up these men and others who would be apt to do the same thing, it was made a strict rule that, where a workman was injured and, through his own negligence, he failed to notify his foreman or report to the doctor, he was laid off without pay for the same number of days as intervened between the time of the injury and the day it was reported or called to the foreman's or doctor's attention. When such punishment was meted out a write-up of the circumstances was made and posted on the safety bulletin boards. In this way all the workmen

were made to understand that the company was determined to do all within its power to prevent blood poison cases.

Pictures, showing a man lifting a casting and, next, wrapping a small cut on his thumb with a dirty piece of a glove, and, last, a picture of his hands with an injured thumb swollen to an enormous size due to a severe infection, were posted on the safety bulletin boards. Other pictures, showing blood-poisoned arms, hands, etc., were posted. As a result of this campaign, blood-poison cases have been reduced to a minimum.

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No. 175

EDUCATING WORKMEN.—A great deal has been said on this subject; in fact, it is the prime factor in the reduction of industrial accidents. It has been proven that the greater portion of accidents are caused by carelessness and ignorance on the part of the workmen in handling tools, such as chisels, hammers, etc., together with the careless handling of material. We cannot guard this kind of work, but we must make the men see that they are at fault by not being careful and thoughtful.

How do the majority of workmen look upon the word "education," that is, in connection with accident prevention? I wonder if the hundreds of workmen from our own country and many foreigners from the other countries realize that they are being educated when they read a safety sign and understand it? It does not make any difference how strong-headed or how set a man may be against "safety," if he continually sees new safety slogans, new suggestions and descriptive pictures of accidents in his own shop to men that he knows and has worked with, there is no doubt that a certain amount of this caution and safety will stick with him. Then he will gradually drift in the right way.

Each of many large manufacturing concerns has a safety inspector, who does all of the safety work throughout the entire plant. All recommendations are received by him and are reported by him. My view of educating workmen is to be one of them. Don't hold yourself aloof and cause them to think that you are someone so important that you cannot stop and talk to a working man. One man can't get all of these safety suggestions; they come from the men who are working with the machines and tools, and dangerous conditions are found by them, which should be reported, and if the safety inspector is someone they do not know or who has not time to stop and talk to them, where is the safety end of it? The condition may run along until some one is injured by something not reported.

With the aid of a safety committee in the shop dangerous conditions are more easily found out and reported. Workmen can see and talk to a man on the safety committee who is working every day in the shop in which this dangerous condition may be, and the dangerous condition may be reported to the man on the committee or to the safety inspector. With the committeemen getting together at different times and talking over the safety work, naturally they become well versed on what is safe and what is not safe, judging from that the things that should be reported without hesitancy, and it is just these men with this kind of spirit that we need in the shops.

A continual study of the workmen in their different occupations will get at the foundation of carelessness which rolls up the toll of suffering. When these dangerous conditions are seen, and can be pictured, showing the safe and the unsafe ways of doing or carrying on a particular work, they should be published widely so that all workmen may be informed.

Stay among the men, work with them for safety pointers, receive their suggestions, get their co-operation, and safety education will gradually "kill" carelessness and the greatest safety slogan printed—"A careful man is the best safety device known"—will prove all earnest endeavor with success.

No. 176 CARELESSNESS OF EMPLOYES.—Most of our accidents are of a minor nature. Occasionally we have serious accidents. We have endeavored to guard all of our machinery where accidents are likely to occur, and we are still working on this line. It has proved of value to us, in that it has reduced very much the seriousness of the accidents.

A very common accident with us in the past was when a man had the ends of his fingers nipped. We designed and applied a nip-guard, and such accidents today are very rare; in fact, in the last two years there has been only one accident of that kind. It was due to the fact that the machine runner left the nip-guard off when he started the machine after putting in new rolls.

We had recently an accident, which might have proved very serious, where a man took a ladder which was very small at one end, made to fit a certain place. The ladder had safety feet, but in some way the man broke off one of the feet, and, instead of getting a new ladder, he turned the ladder upside down. The man who was working with him was some distance away and he shouted to him not to use the ladder that way, saying it was not safe.

Before the man who gave the alarm could get to him, he started up the ladder, and, of course, it turned over with him. As he fell on the broad of his back a distance of some ten feet, it might have been a fatal accident, but luckily for the man he was not injured seriously.

Our shafting, where it is possible for our employes to come in contact with it, is guarded. Before that was done, we had only a few accidents—two, I think—from men getting caught.

## PRIZES FOR MAY ARTICLES.

*First Prize. No.* 164. *J. D. Hackett, Welfare Adviser, New York City.*

*Second Prize. No.* 170. *L. A. DeBlois, Chairman, Safety Commissions, E. I. du Pont de Nemours Powder Company, Wilmington, Del.*

*Honorable Mention. No.* 165. *Martin Seller, Inspector, Aetna Life Insurance Company, Chicago, Ill.*

*Other meritorious articles were contributed by E. M. Coyle, Inspection Department, Prudential Casualty Company, Indianapolis, Ind., Lynn Osmer, Assistant Superintendent, Blooming Mill, Wisconsin Steel Company, South Chicago, Ill., Charles B. Scott, Manager, Bureau of Safety, Chicago, Ill., and R. E. Smith, Safety Inspector, Universal Portland Cement Company, Buffington, Ind.*

## COMMENTS BY MEMBERS OF THE COMMITTEE.

No. 170 receives my vote for first prize. This article is well written and certainly will be helpful to those who are interested in this safety movement. The main thought I get from this article is that men—not only the mechanics, but every one connected with the firm, from the superintendent down to the sweeper—must co-operate and have the movement foremost in their minds. The trouble is that when an employe is instructed in his line of work; or, as we term it, "broken in" at his machine or whatever class of work he is employed at, the mechanic or foreman who instructs him shows him only how to do his work and seldom explains the dangers connected with it.

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Thoughtful or experienced men will not have the hardihood to dispute the general statement of faults so continually to be met with in some industrial plants, which the writer of Article No. 170 understands and exhibits so ably. His corrective methods possess merits; they are sound and worthy of adoption by employers and employes.

No. 164 is fine; but I must cast my vote for No. 166. The writer of it went to a depth that could be reached only after the most careful study and close contact with actual conditions in the effort made to reach the goal. It disposes of the old idea that prevailed in days now past, but which still hangs on persistently in some quarters yet, and that is the perverse conviction of some that it is a futile proposition trying to educate "an ignorant workman who doesn't care what you do for him."

I vote in favor of No. 167, because the author is evidently endeavoring to stimulate the small employer to protect the life and limb of the employe. The large employers, generally, are doing it; so why waste prizes upon the repetition of a lot of suggestions for missionary work among the already converted? This article, in stating that someone is hiding behind an insurance policy, points directly at the guilty person, whose conscience should drive him out of hiding and prod him on to the best safety efforts he has in him.

I select No. 170 for first prize. While I agree with the writer of this article in his main issues, I fail to agree with his claim that only 10 to 20 per cent of preventable accidents can be eliminated by mechanical safeguards. From all the writer has been able to learn, this percentage should be somewhat higher, although I do not believe that there are at present any fixed figures whereby to compute such a percentage. This one detail, of course, is a minor one in comparison with the article in general.

I believe that the writer of No. 164 should be given the first prize, as his article deals with one of the most important factors of accident prevention, viz.: that of organizing safety committees in the smaller plants employing less than one thousand men. The plan, as outlined by the writer, I believe should be very effective. The writer of No. 166 also touches a very important feature of accident prevention work in his article on the responsibility of the heads of departments, and is my choice for the second prize.

I cast my vote for No. 170. The author apparently has made a study of accident prevention from a practical standpoint, and he has covered his text, "The General Application of Safety Devices," thoroughly. I wish that every employer of labor in our numerous small manufacturing plants could read this article.

No. 164 is worthy of first prize. The writer has made a clear analysis of the theory and principle of the "Safety First" movement. He has touched upon one vital truism, namely, the absolute necessity of the "man at the top" being an enthusiast, a firm believer of what he perhaps preaches, something which is more the pity often preached and not practiced.

The most interesting article is No. 164, for the following reasons: His suggestions for safety organization are as near perfect as it is possible to make, and they ought to be highly appreciated. I like the idea of using a blue print to place responsibility for accidents. I vote for No. 164 for first prize.

I vote for No. 164 as the winner of the first prize, as it covers more "Safety First" advices and prescribes more cures for their neglect than the other articles. All the articles are very good, and they should be interesting to all your readers, especially the members of safety committees. No. 164 received my choice in preference to No. 170 by a very close margin, therefore, I wish to accord the second prize to the latter, which contains many excellent points. The good suggestions in the last paragraph of No. 164, in reference to sanitary lighting, keeping of

floors clean and looking after the physical conditions of workmen, decided me in favor of that article.

I cast my vote for No. 165, believing that the article contains more of real interest to the "men on the job," as it more thoroughly expresses the idea of the proper method, from the workman's standpoint, for the prevention of industrial accidents.

No. 170 gives some valuable information on the proper application of safeguards. The writer, evidently, drew upon actual experience in this important phase of accident prevention. I remember asking an executive in one factory, "Who has charge of making and installing your safeguards?" He replied, "When a guard is needed someone goes ahead and puts it on." The factory and the guards "looked it." This is not "someone's" job; but the work of a competent man who will study the situation and consult with the head of the department and the individual workman who is to be benefited. I vote for No. 170 for first prize.

In No. 164 we have the meat in the nut. Safety and admonition are fine, but they are only phrases. What we want, and what we must have, is the knowledge by all concerned that safety is a part of the business. Men don't forget pay day; they don't forget the control lever that starts their machines; they don't forget what the whistle means. These things and thousands of other elements are second nature. They constitute mentality. So it must be with safety, but he who knows must ever be on the job to teach him who doesn't know. This must come as a part of the routine. If the boss is a safety man, he will soon have a safety atmosphere about him. No. 164 is my choice for first place.

My choice is No. 167. The writer of this article realizes the fact that without the co-operation of the employer very little accident prevention work can be done even though the support of the employes is gained.

Register my vote for No. 164. While this article purports to be for the beginner in "Safety First" work, it really contains many points of value, even to the bald-headed or gray-haired worker.

No. 165 looks good to me. His slogans are practical, and they should be adopted by every plant. No. 164 is entitled to second prize.

The best article is No. 164, because the writer has covered general principles of safety work in a thorough manner.

## CONDITIONS OF COMPETITION.

*SAFETY ENGINEERING offers each month one First Prize of $10.00 and one Second Prize of $5.00 for Articles relating to Industrial Accident Prevention. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The prizes are awarded for articles describing or explaining Practices, Methods of Management or Operation, Regulations, Systems, Recommendations, Suggestions, Ideas, Safeguards, Safety Devices, or Apparatus. The Committee of Award will be influenced, in each case, by the evidence which the article gives of its writer's knowledge of and interest in accident prevention in general, as well as by the practicability and range of the concrete suggestions made and, in cases where these suggestions are peculiar to some particular industry, the understanding shown of the hazards of that industry.*

*The merits of all articles will be passed upon by a Committee composed of Safety Engineers, Managers, Superintendents of Plants and Workmen.*

*Drawings, sketches and photographs are invited whenever they will aid or supplement the descriptions in articles.*

*Contributors are requested to be as concise as possible. Articles should not exceed the limit of 800 words. The competition is open to everybody competent to write on the subject without the requirement of a consideration of any kind for the privilege of competing.*

*Blanks upon which to submit articles will be furnished on application, but any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

No. 164 receives my vote for first prize. The system of organization and the other suggestions embodied in this article seem to point in only one direction—"Safety First." No. 165 I would consider as taking second place. No. 167 I consider very good. It should be highly commended, as the writer touches on a subject which seldom gets into articles in "The Man on the Job," that is, the small concern.

For first prize No. 165 receives my vote. The suggestions are right to the point. The co-operation of employer and employe will surely create an interest in accident prevention. The more we become instilled with personal caution, the greater progress will be made along safety lines.

No. 164 is my choice, because it makes live suggestions to the man actually in charge of the start of "Safety First" operations.

I cast my vote for No. 164. The article contains many practical suggestions, which are absolutely essential to anyone who would carry on successful safety work and organization.

I consider No. 166 the most forceful article, covering the effectual method of procedure necessary to thoroughly establish safeguards for the preservation of employes from injury or death. I commend No. 168 for the method of bringing to the attention of employes the use of safety appliances.

My vote goes to No. 170 for first prize. The writer deserves 50 points for practicability and range of adaptability. No. 167 is also very good, and should run a close second.

I cast my vote for No. 170. The writer seems to understand the situation of the employer and the employe and the plant conditions, and he has made a very good discussion. But, in my opinion, he has set the per cent low for accident prevention by safeguards.

## THE DANGER OF GIRLS' HAIR

The accompanying picture is particularly interesting at this moment because of a recent decision in New York, awarding damages to the amount of $20,000 to a girl who lost her hair and a part of her scalp when caught in a moving belt not protected.

It is a common argument that small belts do not need protection in the same sense as do larger belts. The

**The belt of this machine cannot catch the operator's hair.**

theory is fallacious. Many serious accidents are on record where a girl's hair has become involved in belts as small as three-quarters of an inch, and serious results have been the consequence.

There are two phases to this question, however. It is as essential that the girls should wear caps over their hair as it is necessary that the belts should be guarded, and the law in that respect should be equally stringent.

# "THE FIGHT AGAINST FIRE"

*COMPETITIVE ARTICLES RELATING TO THE CONSERVATION OF LIFE AND PROPERTY BY FIRE PREVENTION AND DEFINING FAULTS OF CONSTRUCTION AND HAZARDS OF PROCESSES*

**No. 58** TRANSFER AND HOUSEHOLD STORAGE WAREHOUSES.—This is a class of risks which presents a very indefinite hazard, but one whose loss record is bad. The building construction is a very important factor. The large areas and the large elevators necessary make the spread of fires easy and its control difficult. This is often aggravated by the introduction of deck floors, that is, floors that extend over only a part of the area of the building, without partitions to separate them from the other parts, and high enough above the full floors to permit the storage of goods above and below them. These decks increase the total floor area and present a double amount of fuel to the flames. They also interfere seriously with the effective use of fire hose and other fire-fighting apparatus. They require double the number of automatic sprinkler heads. They make the rooms darker, and it is common knowledge that dark places are great rubbish catchers.

The "preferred" construction for storage warehouses is fireproof construction, with no steel exposed, with stairways and elevators in fireproof shafts, with standard firedoors at each floor and a thin glass skylight in the roof. A separate room, with fireproof partitions and standard, single firedoors, should then be provided for each lot of goods stored. Ample fire protection, consisting of casks and pails or approved extinguishers, should be provided, and then a standard, double source, automatic sprinkler equipment will complete the protection.

The goods stored are, of course, the principal source of hazard. These will vary from stoves or pig iron to gasoline and potassium chlorate. Lists of the goods accepted under various grades of hazard can be obtained from any inspection office. For them the rules of the Interstate Commerce Commission and the New York Bureau of Explosives are valuable. The hazards of mercantile stocks in storage can be easily ascertained.

The most common class of general storage or transfer warehouses in the smaller cities and towns, however, is the household storage warehouse, where household furniture, bedding, clothing, etc., are temporarily stored. These may contain soiled clothing or bedding, which will heat, matches, small amounts of gasoline or other inflammable liquids, or other unsuspected sources of fire. They always present the prominent hazard of piled furniture wrapped with combustible material.

Uncertainty is a very marked feature of such risks, not only in the fire hazard, but also in the adjustment of losses. As with any second-hand stocks, the ascertaining of values is a very intricate and annoying problem.

The labor hazard is prominent in storage warehouses, as the rough and ready men needed for the heavy work are notoriously careless. It takes constant supervision to keep them from smoking in the building, damaging the electric wiring, getting the firedoors out of order and otherwise increasing the fire hazard.

Stables are often found in these risks, with the usual hazard of transfer barns, that is, the presence of large quantities of hay, not well taken care of, the loafing of the rough laborers there and the open construction, which includes large areas,

open chutes and a large number of wooden partitions. The men are unmarried usually and they have little sense of responsibility, and are apt to spend their time in gambling and carousing around the stable.

Packing materials and litter present a serious but unavoidable hazard. Standard, metal-lined, self-closing bins should be provided for such materials and all packing materials, except one day's supply, should be kept in a separate fireproof room. The watchman should be instructed to note the condition of the packing room and the presence of rubbish elsewhere and make an early report of any bad conditions to the manager.

Watchman service should be of the very best type, as this will often permit the early discovery of small fires which could easily grow into big ones. He should be required to make a weekly report of the condition of all fire apparatus, and should have a standard system of reporting his rounds, that is, a standard clock or system. Without such a system there is little assurance that the watchman is doing what he is paid to do and is not sitting into the games in the stable.

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**No. 59** SOME HAZARDS IN THE USE OF KEROSENE.—Is there a person who does not know of one or more accidents in using kerosene? We will be careful, we continue to think. Everybody else is thinking the same way. Still the accidents happen!

This is one of the cases where hazard is more often due to lack of knowledge than to lack of care. Being careful, to many people, means keeping the kerosene away from direct blaze when using it to kindle the fire. Really being careful means that you must know why explosive accidents happen and how they can be avoided.

Petroleum, before refining, is a complex substance. When it is distilled, the first products are several different gases, some highly explosive substances, like naphtha and gasoline, and then good kerosene. After the good kerosene there is an increasing amount of heavier substances, like paraffine, mixed in, and, finally, some tar.

If kerosene is mixed with the lighter products, it is so explosive that it is dangerous. If mixed with the heavier ones it will not rise high enough in wicks and the flame will be yellow and smoky.

Good kerosene is not an explosive, although it is inflammable when heated to a certain point. Kerosene-vapor, produced by heating the kerosene to a higher degree, when mixed with air, is explosive. Pour kerosene where there is flame and it will burn. Pour kerosene into a warm place without flame and it vaporizes, and when mixed with air it forms an explosive mixture.

In burning kerosene in lamps or in wick-stoves, the clogging caused by the heavy substances in the oil often prevents the proper working of burners, and causes the parts to become hot enough to cause an explosion.

Merchants sometimes put gasoline in their kerosene, as this lighter mixture burns better, and a poor grade of oil can be sold for a better grade.

Think of the unknown substance, and the unknown risk the purchaser is getting!

I know a merchant who made such a rash statement about the amount of gasoline he would dare to put in the kerosene, that I was convinced he was entirely ignorant of the nature of the goods he sold.

The laws regarding marketable kerosene differ, and inspection is often lax. A home test can be made easily, especially before buying a large quantity. To test oil, take a tin cup about three inches deep, filled to within one inch of the top with oil. Place the cup in a bowl on the table and cover the cup with a piece of cardboard in which you have cut two holes near opposite sides. Into one of the holes, from the under side, slip a thermometer. The scale from an old one will do. Have the bulb half an inch in the kerosene. Cover the opposite hole with a piece of cardboard that has a corner turned up for a handle.

Sit down, with the tester in front of you, the covered hole nearer you and the thermometer-scale facing you, and a box of matches at your right. Pour warm water into the bowl around the cup. When the scale reaches one hun-

dred, begin the test. Light a match, take the reading, remove the little cover and thrust a match into the hole, not deep enough to touch the oil. Repeat with every slight increase of temperature until you get a tiny flash of blue flame.

Lift the cover, blow away the smoke and steam and try the test again. The lowest temperature at which you can get a flash is called the "flash test."

For the "fire test" raise the temperature from 10 to 20 degrees and leave the cup uncovered. The oil in this test should nearly fill the cup. Hold the thermometer with one hand, the bulb half an inch in the oil, pass a lighted match over the oil, not quite touching it. At some point the oil will take fire and burn. The lowest point at which it will take fire is called the "fire test." To extinguish the flame, place the cardboard over.

Kerosene that is good enough will flash at 120 and burn at 140. Kerosene that burns at 110 will flash at 100, and is on the verge of real danger.

Kerosene exposed to a temperature of 20 degrees F. for half an hour will turn milky if it contains paraffine.

If you know the nature of kerosene and take time and care to be sure you are getting good oil, to keep burners and wicks in good condition, and never to use kerosene for kindling in a warm stove after the fire has gone out, you can eliminate the usual hazards in the use of kerosene.

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**No. 60** FIRE PREVENTION: ITS ENFORCEMENT, AND THE NEED OF EDUCATION ALONG FIRE PREVENTION LINES.—The old proverb, "An ounce of prevention is worth a pound of cure," is especially true in connection with fire prevention. When the enormous fire waste is considered each year, especially in the United States, the wonder is that the civil authorities can remain so indifferent in such a vital matter. Millions of dollars spent each year to buy—smoke!

Property loss can be partly or wholly covered by insurance, but insurance cannot replace loss of life, loss of employment, loss of business, etc. As fire is the cause of these economic misfortunes and the enormous money loss before alluded to, common sense says the remedy is the prevention of fire.

The fundamental principles of fire prevention are: First, the protection and saving of life. Second, the protection of property. The second principle may be subdivided into the actual protection of property from outside exposure and confining or preventing the spread to adjoining property of any fire actually occurring in a building.

Theoretical ideas, or mere knowledge of the principles of fire prevention, are of little value, however, unless they are put into practice; and this brings us back to the civil authorities and the need of practical and effective legislation to enforce compulsory fire prevention.

Place fire prevention on the statute books of every State and charge the various municipalities with the duty of enforcing it. Give them the necessary power, help and support in carrying out this work; stand behind them in their demands.

Enforce the law of individual responsibility for fires. Prohibit and prevent the placing of fire insurance policies on any building or premises, on which a violation from a local fire prevention bureau exists, until said violation is removed. Make the owner or person responsible for a fire, occurring through carelessness or neglect, pay the penalty or cost of his indifference. Hold the responsible parties for the cost of fire department operations, for damage to property, for loss of life. Reach their pockets. That is the remedy.

Have all laws and ordinances relating to fire prevention enforced by the local fire prevention bureaus. Have no divided responsibility on this score, no conflict of authority. Safety, and the good of the community, first!

At the same time the property owner should get a "square deal." His building should not be gone through with a "fine tooth comb," but every direct hazard to life and property that exists should be remedied.

Inaugurate an educational campaign along fire prevention lines. Reach the

children, the workers, the home, and you are on the right track. The children could be reached through the class room and interesting lectures illustrated by stereopticon views.

The factory workers could be reached by the lecture system also. Employers could shut down operations for a rest period of five or ten minutes once a week while a specially prepared lecture, which could be varied to suit the different occupations, would be delivered by a fireman or an inspector of the local fire prevention bureau in uniform.

Have these lectures at regular intervals, and touch on the principal points of fire prevention. Show the workers how their safety depends on their proper conduct and their livelihood on the proper observance of the rules laid down in the lectures. Show them the advantage and importance of good housekeeping in their own homes. The returns on the investment of five or ten minutes' time would be large and well worth while. Get the people to THINK.

What is wanted most at the present stage of fire prevention is education, and then more education.

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**No. 61** AISLES IN DEPARTMENT STORES.— Much has been said and discussed relative to fires, prevention of fires and panics in department stores. Many suggestions have been offered. In connection therewith permit me to make a few suggestions, which may seem trifling, but will, no doubt, if properly carried out, aid in reducing loss of life and injuries, in case of fire or panic, to a minimum.

Great care is taken to have all aisles in theatres, moving picture theatres, music halls, etc., of sufficient width, unobstructed and lead directly to exits. Why not in department stores adopt the same plan? When one enters a department store or steps from a stair landing the first obstruction he usually meets is a counter, and he then must turn to his right or left to get to an aisle that would lead him to a counter from which he desires to purchase goods. In case of a fire, he must pursue the same course in getting to an exit which will lead him from the building.

To obviate this trouble and aid in emptying a building in case of fire, an aisle, say 4 feet or 5 feet in width, could lead directly from each entrance and run the entire depth or length of such building. Where stairways are used, an unobstructed aisle of 4 feet or 5 feet could lead from the platform of such stairs and run back the entire width or length of the building. Minor aisles could be so situated to empty into such main aisles.

Where stairways are situated in the corner of a building, one main aisle could run the length and the other the width of the building. In many instances the main aisle from the stairway would intersect the aisles leading to the main exits and in such a way afford a quick exit from the building. The aisles leading to stairways would also bring persons to the elevators which are adjacent to or near the stairs.

Furthermore, over each stairway and main exit could be placed a sign "EXIT" with letters about 8 inches high, to be

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## PRIZES FOR MAY ARTICLES.

*First Prize. No.* 56. *H. L. Simpson, Panama-Pacific International Exposition, San Francisco, Cal.*

*Second Prize. No.* 55. *Richard H. Borden, Jr., Fireman, Engine Company No.* 4, *New York City.*

*Honorable Mention. No.* 54. *Leon Howard, Lieutenant, New York Fire Department, Engine Company No.* 271, *Brooklyn, N. Y.*

*Another meritorious article was contributed by R. R. Faitoute, Secretary, Bureau of Combustibles and Fire Risks, Newark, N. J.*

illuminated in the night, or a red light could be made use of. These could be placed about 10 feet above the floor, so as to be visible to all persons on the floor. On each stair landing and columns could be placed buckets of water, an axe, a hook and extinguishers.

With this plan carried out, a person entering a department store or stepping from a stair landing would have before him an unobstructed aisle, instead of counters, and, in case of fire or panic, he would retreat from the building the same way he came in. In addition, access to the auxiliary fire appliances could be had easily.

## COMMENTS BY MEMBERS OF THE COMMITTEE.

No. 56 is the best article, as it draws to attention the good work done in fire prevention in the past few years; also to Fire Prevention Day, a day in which numbers of fires are prevented by the people cleaning up their homes and preventing unnecessary fires.

I select No. 55 as the winner. The subject of safety in hotels is one of vital importance as they are the homes of the travelers, many of whom are unfamiliar with the means of exit in case of fire. Most of the buildings, erected of late, are of modern construction, but the owners or proprietors of those where dangerous conditions exist favorable to fire should remedy the same to the best of their ability, as the responsibility for the safety of the inmates rests upon them.

No. 56 is an excellent article on fire prevention, and fire waste; also it brings forward some very good suggestions. It is my opinion that it will be a long, drawn out contest to bring the people of this country to a full realization of the importance of this subject, especially in view of the poor example shown the younger generation by the older, grown-up people, older heads that should know better, such as drawing gasoline in the open while smoking, throwing half-burned matches, cigarettes, and cigar stubs promiscuously about; i. e., if there does not happen to be a waste paper basket within firing distance. I have seen the fool stunts pulled off often. Children will be quite sure to follow the lead. I believe in beginning with the young tots in the school. I vote for No. 56.

I vote for No. 54, because it describes in simple language the fire extinguishing characteristics of common sawdust, a material which is often at hand. Essays of this kind, while

## CONDITIONS OF COMPETITION.

*To assist in preventing losses of life and property by fire, SAFETY ENGINEERING offers each month one First Prize of $10.00 and one second Prize of $5.00 for Articles, Suggestions, etc., relating to Fire Prevention and Fire Extinguishment. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

*The work and efficiency of public fire departments, fire prevention bureaus, and private fire brigades present many important subjects for discussion.*

*Short, practical articles are wanted on every subject that will prove of value to firemen (public or private), and to inspectors and others interested in The Fight Against Fire. Articles may cover methods and practices relating to fire fighting and fire prevention by public departments, faults of construction that create fire perils, the fire hazards of processes that endanger life and property, how firemen and public inspectors may qualify themselves for advancement, the character and use of apparatus and other equipment, private fire brigade organization and drill, employes' exit drills, regulations and requirements of all kinds, etc.*

*In passing upon the articles submitted, the Committee to Award Prizes will be influenced, in each case, by the evidence an article gives of its writer's knowledge of and interest in fire prevention or fire extinguishment, in general, and by the practicability and adaptability of the writer's suggestions and ideas.*

*Articles will be received from any person competent to discuss the question of fire prevention and fire extinguishment. Contributions are especially invited from members of city fire departments and fire prevention bureaus, members of well established private fire brigades, insurance engineers and others. Articles should not exceed the limit of 800 words. No consideration of any kind is required for the privilege of competing.*

*Drawings, sketches and photographs may be submitted whenever they will aid or supplement the texts of articles.*

*Blanks upon which to submit articles for this department of SAFETY ENGINEERING will be furnished on application. But any legibly written or typewritten manuscript containing the name, address, business and position of the writer will be acceptable.*

simple in subject, are particularly valuable, because they are of the nature of first-aid lessons, the principles of which any reader can absorb readily and apply quickly when necessary.

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It is a difficult choice between Nos. 54 and 56, so evenly balanced are their merits, but the logic of No. 56 is a little better; it devlops the reason why a little more clearly and covers the entire ground more nearly. So I feel constrained to vote for No. 56, although No. 54 is capable of more immediate practical application, or rather is more likely to be practically applied at once to a greater extent but not to the probable extent it would be if the action of the soda in the mixture was made more clear and important points of merit as compared with certain other appliances that are "standard" were stated.

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I cast my vote for No. 55. The author of this article has evidently given fire protection for theatres considerable study, and many of his recommendations are quite timely and appropriate.

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I favor No. 55 for his general knowledge and interest in the matter. The article covers a wide scope, relative to fire prevention and fire fighting.

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I vote for No. 56 for first prize. The four articles in the May issue are worthy of consideration, but, in my opinon, No. 56 is the best article. To educate the whole population on the enormous annual fire waste, and especially starting with the children, by a course of public lectures and instructions on fire prevention will, at least, interest a sufficient number of people who will start cleaning up useless accumulations of rubbish that cause unestimated losses. If each person contributed their pro rata share of carefulness, the annual waste would be greatly reduced. There is much indifference displayed on the part of some of our people; whether this is due to ignorance or just to be indifferent, we cannot always be sure, but if it became necessary by law that all should be properly instructed in fire prevention, no excuse could be offered.

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No. 56 is the best article on fire prevention, as the writer comes to the point for every one to preach fire prevention. They are teaching fire prevention in the schools in New York City and it should be done all through the United States, as the children are willing to learn, and they tell their parents about their lessons and also of the different hazards.

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No. 56 is the article entitled to first prize, as the writer brings clearly to the minds of the public the disastrous results of fires caused by carelessness and neglect. Only by educating and instructing our citizens and children can we hope to reduce the country's great fire loss.

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## "SAFETY FIRST" IN FACTORY CONSTRUCTION.

The bill passed by the Legislature of New York, known as Assembly Bill 1958, to amend the labor law, was vetoed, very properly, by Governor Whitman. The bill:

An Act to amend the labor law, in relation to factories.

The people of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. That subdivision of Section 2 of Chapter 36 of the laws of 1909, entitled "An act relating to labor, constituting Chapter 31 of the consolidated laws," as added by Chapter 529 of the laws of 1913, defining the term "factory building," is hereby amended to read as follows:

FACTORY BUILDING. The term "factory building," when used in this chapter, means any building, shed or structure which, or any part of which, is occupied by or used for a factory, *and in which at least one-tenth of all the persons employed in the building are engaged in work for factory, but shall not include a building used exclusively for dwelling purposes above the first story.*

2. Subdivision 1 of Section 79 of such chapter, as added by Chapter 461 of the laws of 1913, is hereby amended to read as follows:

79-f. MEANING OF TERMS. The following terms when used in this article shall have the following meaning:

1. FIREPROOF CONSTRUCTION. A building

shall be deemed to be of fireproof construction if it conforms to the following requirements: All walls constructed of brick, stone, concrete or terra cotta; all floors and roofs of brick, terra cotta or reinforced concrete placed between steel or reinforced concrete beams and girders; all the steel entering into the structural parts encased in at least 2 inches of fireproof material, excepting the wall columns, which must be encased in at least 8 inches of masonry on the outside and 4 inches on the inside; all stairwells, elevator wells, public hallways and corridors enclosed by fireproof partitions; all doors, fireproof; all stairways, landings, hallways and other floor surfaces of incombustible material; no woodwork or other combustible material used in any partition, furring, ceiling or floor; and all window frames, doors, and sash, trim and other interior finish of incombustible material; [all windows shall be fireproof windows except that in buildings under 70 feet in height fireproof windows are required only when within 30 feet of another building or opening on a court or space less than 30 feet wide; except that in buildings under 100 feet in height there may be wooden sleepers and floor finish and wooden trim, and except that in buildings under 150 feet in height heretofore constructed there may be wooden sleepers, floor finish and trim and the windows need not be fireproof windows, excepting when such windows are within 30 feet of another building]. *Approved wire glass shall be required to be installed in all cases where glass is permitted in a fire retarding enclosure of a vertical shaft; windows shall be protected by approved fireproof shutters or approved wire glass in all cases of horizontal outside exposures where the distance is 30 feet or less, measured from opening to opening. All windows, or other openings, in side walls fronting upon the roofs of adjoining buildings shall be protected with approved fireproof shutters or approved wire glass from the level of the adjoining roof to a height of 50 feet, measured in a straight line from the center of the skylight or other opening on the adjoining roof to the top of the window or other opening in question. In buildings hereafter erected all windows or other openings in sidewalls of buildings fronting upon the roof of adjoining buildings which are between 50 and 80 feet distant from the skylight or other opening of the adjoining roof, as measured in a straight line from the center thereof to the top of the window or other opening in question, may be protected by plate glass not less than one-quarter of an inch in thickness, and that in buildings hereafter to be erected all exterior openings more than 150 feet above the street level must be protected by fireproof doors or shutters, or approved wire glass, or plate glass not less than one-quarter of an inch in thickness, except that in buildings under 100 feet in height there may be wooden sleepers and floor finish and wooden trim, and except that in buildings under 150 feet in height heretofore constructed there may be wooden sleepers, floor finish and trim and the windows need not be fireproof windows, excepting when such windows are within 30 feet of another building.*

3. This act shall take effect immediately.

NOTE: Matter in italics is new; matter in brackets [] is old law to be omitted.

In respect to the definition of a factory, the amendment is good, and had it not been burdened with what followed would doubtless have been approved.

The proposed amendment to the existing law on window protection was a decided step backward. It has been a hard and tedious task to write into our laws such elements as we have, looking to the protection of life and property from fire. Safety materials and devices cost money, and enactments compelling their use meet with the united opposition of property owners and manufacturers whose products are displaced. Unfortunately, this antagonism does not cease even when such laws are passed, as is evidenced in this bill.

The importance of the exposure fire hazard is so well known that no argument is needed for the adequate protection of window openings, particularly in factories with a large number of occupants. In the bill the proposed amendment was a retrogression in every sense. In the case of an adjoining building 100 feet wide with skylights in the center, 50 feet, measured in a straight line, would take in no more than the lowest level of windows, if indeed it would stretch that far; while the permission to use ¼-inch plate glass between distances of 50 to 80 feet was little short of fantastic. Plate glass is used, ordinarily, in comparatively large sheets, and is even more vulnerable to the attack of fire than comparatively small panes of ordinary window glass.

Shutters and wireglass in metal frames have proven their value so often and so conspicuously that future laws should extend, not restrict, their use.

Governor Whitman displayed wisdom and a regard for "Safety First" in vetoing this bill.

## THE ELEPHANT HAZARD.

An angry elephant in circus-quarters in Hackensack, N. J., seized a lighted kerosene lantern and tossed it to a hayloft, setting the building on fire.

# MATERIALS, APPARATUS, PROCESSES

## CENTURY BUILDER'S BOOK.

Building material which combines permanency, protection against fire and weather, lowest ultimate cost and pleasing architectural effects has much to commend its use.

The "Century Builder's Book," published by the Keasbey & Mattison Company, Ambler, Pa., is devoted to a description of Century Asbestos corrugated roofing and sheathing, Century Asbestos building lumber and Century Asbestos shingles, which have been listed and approved by the Underwriters' Laboratories, Inc., and the American Society for Fire Protection. The materials, with the qualifications enumerated, are being used to a larger extent each year.

These products, which are effective retardants and heat insulators, consist of the highest grade of Portland cement and asbestos fiber, integrated thoroughly and matted to form a strong, tough texture which is non-combustible, its strength and weather-resisting qualities increasing with age.

Century Asbestos materials are used in large quantities by the United States Government, the Standard Oil Company, the American Agricultural Chemical Company and leading iron and steel companies, piping and refining companies, railroads, steamship lines, gas and coke companies, etc.

Not only is Century Asbestos building lumber used for sheathing outside walls, it is employed also as wainscoting and paneling for interiors, for lining store rooms containing combustibles, for motion picture booths, laboratories and compartment doors, barriers and box linings, for electrical switches and other apparatus, and it enters also into the construction of many appliances where thermal and electrical resistances are required.

This book, containing much of interest concerning a building material which is time-proof and fireproof, can be obtained on request.

## PANIC FIRE DOOR LATCH.

For loft and factory buildings, motion picture theatres, schools, hotels, offices, etc., where hinged fire doors are used, the Peters Fire Door Latch commends itself on account of its reliability.

The latch is for use on all hinged fire doors at entrances to fire towers, or any place where a hinged fire door is needed. It is a combination of malleable and wrought iron, and is operated by a slight pressure against a crossbar which transmits a motion to the spindle through the door, which spindle lifts the latch bar and thereby disengages it from the keeper, allowing the door to be opened. It is positive in its action, being without springs or unnecessary attachments to get out of order.

**Peters Fire Door Latch.**

The fire door latch is manufactured by James Peters & Son, 1934-38 North Front street, Philadelphia. It has been approved by the Bureau of Fire of the City of Philadelphia.

## NEW STANDARD MATERIAL.

"Simplex" Hollow Tile has been pronounced "the most important and valuable addition in fireproof building construction made in years."

In the construction of the floors of fireproof buildings hollow tile is standard material, due to the many advantages possessed by it. Not only can hollow tile be erected with safety in freezing weather, but it resists fire and moisture, is sound proof, and, being hollow, the weight is not excessive.

Years ago Maurer of New York established a standard of excellency in hollow tile construction, Maurer hollow tile having been made superior to minimum building code requirements, and it remained for him, without modifying the standard of excellence that he set, to devise an improvement in the formation of hollow tile, which has reduced installation costs 40 per cent. This is being accomplished by means of "Simplex" Hollow Tile.

Due to the design of the tiles, a lug is formed whereby when two or more are placed together a recess is created, in which cement, made to the proper consistency, is permitted to run in and fill the recess from the top, forming a full joint for each member of the

floor arch, thereby creating perfect fireproof floor construction.

Another advantage of the installation of the "Simplex" arch over the old method is that the tiles can be laid on a dry, wooden centering and erected as stated. As little or no cement adheres to the bottoms of the arches, stains, which often appear in the ceiling finish under old forms of floor construction, are avoided.

Due to their simplicity, reliability and decided saving in construction cost, the "Simplex" Hollow Tile flat floor arch and "Simplex" segmental floor arch are being employed more and more each year in building construction.

"Simplex" tiles are manufactured by Henry Maurer & Son, 420 East 23d street, New York.

## FACTORS OF SAFETY IN COMPOSITION FLOORING.

When flames swept through the Court House Annex, Troy, N. Y., about a year ago, they carried everything before them until they came to the Troegerlith Fireproof Composition floors and wainscoting. Then the fireproof qualities of the material stopped the flames from spreading further, and, to quote the words of A. K. Mosley, of Demers, Mosley & Campaigne of Troy, "except for this composition flooring the building must, in the writer's opinion, have been totally burned."

**Troegerlith Composition in Court House Annex, Troy, N. Y., the fireproof qualities of which stopped flames from spreading and saved the building from total destruction by fire.**

If this composition had not contained a large percentage of minerals and asbestos, the heat would have caused the floors to crack; it withstood the fire beyond expectations. In connection with this, it is well to remember that composition flooring, to be fireproof, must contain a small percentage of wood flour and a large percentage of asbestos. Another factor, which enters into the fireproofness of a composition flooring, is the manner in which it is installed; that is, in one or two layers.

The Troegerlith Tile Company, after studying this problem, found that the one-layer floor, while a little more expensive to lay, proved to be more fireproof, because the underlayer of a two-layer floor was composed generally of a large quantity of sawdust and sand, and the filler would not bond to the foundation without using a wire mesh to form the bond.

The experience is that, by using a long-fibred asbestos, a one-layer floor is as resilient as one laid in two layers, and at the same time it gives added fire protection. Further, a single-layer floor, of good material throughout the entire one-half inch, has greater wearing qualities. Once the top section of a two-layer floor has worn through, the balance goes rapidly, as the sawdust and sand, of which it is constructed, possess little or no wearing qualities. Floors laid ten years ago under the formulae and methods used by the Troegerlith Tile Company are giving good service today.

## RAISING THE STANDARD OF FIREDOOR PROTECTION.

In most manufacturing plants there is the necessity of communicating openings in fire walls, with self-closing firedoors acting as fire stops. Operating conditions and convenience demand that under ordinary conditions these doors must be kept open; fire prevention demands they should be closed quickly before a fire can get near the opening; investigation has shown that many of the devices used for this purpose are antiquated, unreliable and slow in their function.

The "Automatic" Firedoor Release, manufactured by the "Automatic" Sprinkler Company of America, New York City, insures the security from fire which fire walls and closed firedoors afford, as it assures the closing of firedoors at just the right moment while freely permitting them to be open.

This "rate of rise" device is small, self contained and operated mechanically. Automatic and positive in its action, it operates on a new principle of fire detection. It is flexible and adaptable to all conditions, simple to install, requires no attention after installation, and insures the closing of a firedoor before a fire can get within twenty-five feet of an

opening, thus eliminating the possibility of fire passing through.

Air, the medium employed for the operation of this device, was chosen because it is sensitive to changes of temperature, and is constant and dependable, expanding instantly without lag. In all local conditions, from a cold storage plant to a hot drying room, there is a readily determined "rate of rise" in temperature, the "rate of rise" caused by the occurrence of a fire being many times greater than that caused by any normal condition; and, while this "Automatic" Firedoor Release is not affected by normal changes, automatically adjusting itself to them, just as soon as the temperature rises faster than the rate at which it is set the device operates, closing the firedoor within a moment or two of the start of the fire, and, if so desired, sounds an alarm in any part of the building.

It is claimed that this mechanical watchman, constantly on the alert, is the quickest known detector of fire, thus insuring maximum firedoor efficiency, and its record in actual service indicates that it is destined to raise the standard of firedoor protection.

An interesting book, descriptive of this "rate of rise" device, has been published by the "Automatic" Sprinkler Company of America, and it may be obtained by addressing the company at 123 William street, New York.

## FIRE PROTECTION ASSURED AUTOMATICALLY.

The most urgent need in case of fire is unquestionably an immediate alarm. In most cases fire spreads with rapidity, and often the only chance to arrest that spread is insured by a prompt alarm and quick action as soon as possible after it has started.

The Aero Automatic Fire Alarm, manufactured by the Aero Fire Alarm Company, 5 Church street, New York, has proved its value and dependability, through years of steady service, in giving immediate notice of fire within a few seconds after its outbreak, and thus summoning aid when most needed.

The Aero Automatic Fire Alarm consists of a copper tube of small diameter, which runs through the space to be protected. This hollow wire is extended along the ceiling or around the mouldings, and is practically invisible. The tubing is connected with a small cabinet, containing a sensitive diaphragm, electric contacts and bell connections. A fire, starting in any room or closet protected by the Aero system, heats the air in the tubing, causing expansion through its entire length, thus moving the diaphragm in the switchboard, closing the electric circuit, which rings the bells and shows by an indicator in which room or section the fire has started.

The alarm can be given in as many places as desired and connected by electric wires to a central station or fire headquarters. All chance of false alarms is eliminated by a relief valve, by means of which the air pressure inside the tube is always kept the same as that of the room equipped. This valve takes care of the variations in temperature due to the lighting of gas jets, changes in heating, etc., which create only a slight rise in temperature. Any outbreak of fire, however, causes a sudden rise in temperature, and creates a pressure that cannot escape through the relief valve.

This mechanical device, as responsive as human intelligence and more reliable, is included in the list of fire appliances published by the National Board of Fire Underwriters, and endorsed by the Fire Office Committee of Great Britain. It is described fully in a new booklet issued by the Aero Fire Alarm Company. The device affords at moderate cost a means of protecting every foot of space in buildings against the fire hazard.

## MEETING THE TESTS OF FIRE AND SERVICE.

The picture herewith illustrates the important part the high-grade modern fire door plays in fire protection. It shows a "Peelle" Truckable, Counterbalance, Fireproof, Freight

**After an actual fire test in the top story—the hottest point—of a six-story building in Pittsburgh. This door prevented radiation of heat into the shaft.**

Elevator Door after test in a fire in the top story—the hottest point—of a six-story building in Pittsburgh, Pa.

The destruction caused to walls, ceilings and floors by the fire is shown clearly. The "Peelle" door so thoroughly prevented the radiation of heat into the elevator shaft that the painting in the shaft directly back of the door was not scorched.

The proven reliability of the "Peelle" door, in making each floor a fire unit, does not alone account for the extensive use of these doors. Other advantages, secured by their use, which have been strong factors in their installation, are: They close openings entirely, eliminating all possibility of accident, and afford a smooth, solid, trucking sill, preventing all possibility of injury to freight handlers and others by the throwing of heavy merchandise, etc., from trucks passing over the open spaces between the floors of cars and the floors of buildings. This trucking feature, combined with the fact that it saves space, time, life and property, and can be made to harmonize with the finest surroundings, has been a strong factor in the inclusion of the "Peelle" freight door among the appointments which make a modern building.

## THINGS A LUMP OF COAL CAN DO.

The variety of things which modern science is able to evolve from a lump of coal is shown in graphic fashion by the Barrett Manufacturing Company in its exhibit at the San Francisco Exposition An enormous block of soft coal is shown, surrounded by its children. The first generation consists of ammonia illuminating gas, crude benzol, coal tar and coke.

The crude ammonia is the parent of household ammonia and of the anhydrous ammonia used in producing artificial ice. Then there is ammonia chloride, an important element in electric batteries. Ammonium nitrate is used in the production of high explosive. Ammonium bicarbonate is valuable in the modern baking of food, and most important of all is ammonium sulphate, a powerful soil nitrifying agent, which is becoming of importance to American farmers as a fertilizer. Plants of various kinds are shown, grown with and without the ammonium sulphate under identical conditions, exhibiting a difference in the strength of the crops.

Illuminating gas burns up in a blaze of light and leaves no heirs.

Crude benzol has progeny of analine dyes, and it is of great importance also in the manufacture of automobile tires and in the production of artificial leather. Then there is toluol, a basis for modern high explosives, and much in demand for the war.

Coal tar, the fourth of coal's immediate descendents, is the mother of tarvia, the bituminous binder for building automobile-proof roads. Barrett Specification Roofs, consisting of tarred felt and pitch, are used for practically all the great commercial buildings such as the New York skyscrapers.

There is also a long list of the ready-roofings used by farmers for their barns; felt and building papers for the lining of walls to keep out heat and cold, and waterproofing felts, which are used with pitch for the lining of excavations, basements and tunnels to exclude dampness of the soil. Then there is paving pitch, used in the joints of block pavements for city streets. Creosote oil, which can be impregnated into wood and make it proof against decay, gives us wood block street pavements, durable piling, mine timbers and long lived fence posts. Creosote is worth $25,000,000 a year to the country in its ability to prolong the life of fence posts.

In addition, coal tar is the parent of innumerable chemical and medical products, especially phenol or carbolic acid, an indispensable medical disinfectant with innumerable industrial uses, including the process of manufacturing phonograph records.

Naphthalene, or coal tar camphor, is useful in keeping moths out of clothing.

Among the other great-grandchildren in the carbolic branch are picric acid, a high explosive, and a long list of bactericides and disinfectants, including pyxol, which is twenty times as powerful as carbolic acid, and is death to germs of all kinds and harmless to animal life.

**Graphic Illustration of the Wonderful Possibilities of Coal Tar**

Coke is useful as fuel, and it has special value in the steel industry.

All told, coal has the largest variety of derivatives of anything that is dug out of mother earth. The Barrett Company's exhibit in the Palace of Mines and Metallurgy shows many of the processes. It has been well planned.

## POWER'S CAMERAGRAPH

A search through the records of recent mechanical expositions disclosed the interest-

ing fact that the Power Cameragraph had practically a corner on the medals and other awards for projection machines. In the list are the much-coveted prizes of the American Museum of Safety and the Efficiency Congress. The Power machine is on nearly every battleship of the United States navy possessing a projection machine. It is seen also at practically all of the army posts. Y. M. C. A. buildings, churches and schools are other fields in which the Cameragraph holds almost uncontested sway.

When Mr. Presburg, president of the Arena Amusement Corporation, decided to use motion pictures in Madison Square Garden, New York, the largest amusement place in America, where many of the most notable events in the world have taken place, he was confronted by many difficult problems, chief of which was the projection of the pictures. Many suggestions were made as to the location of the booth for the projecting machines. Among them was one to hang the booth from the iron girders and place the machines therein. W. C. Smith, the well-known projection engineer of the Nicholas Power Company, manufacturers of projection apparatus, suggested the placing of the machines at one end of the hall and projecting the pictures a distance of 300 feet. This is the longest throw on record. Tests by Mr. Smith proving the practicability of the long throw, he received carte blanche on the matter of projection, and the Nicholas Power apparatus was installed, consisting of two Power's Cameragraph No. 6A machines.

During the electrical display at night, when the North Atlantic Squadron was in the North River, New York, the Power projecting machine was used as a searchlight to throw its powerful rays on the United States flag, thus dispensing with a regular searchlight, which was used for other purposes.

## UNDERWRITERS' NEW LABEL.

Up to a few weeks ago the Underwriters' Laboratories, Inc., had never granted their label to any safe, but, after an unusually severe test, a new label has been granted for this class of product, and the first and only one in use has been given to the S-cientest Model of the Safe-Cabinet, manufactured by the Safe-Cabinet Company, Marietta, Ohio.

Two years ago the Underwriters' Laboratories classed the Safe-Cabinet—1913 model—as an "Insulated Cabinet." In testing articles, with the view to admitting them to that label service, only one principal test is made, namely, a straight heat test, this being only about one-third as severe as the one conducted during the "safe" testing and examination. The impact and precipitation test is not required for the "Insulated Cabinet" label. Therefore it can be perceived that the test requirements for the "Insulated Cabinet" and "Light-Weight Safe" labels are radically different, and so are the grades of the resulting endorsement and approval.

Never before was the name adopted for this well known and largely used product so apparent as now—a safe in protection, a cabinet in appearance and utility. A light-weight container, offering the protection of a heavy iron safe, built in cabinet construction, was the idea originated and perfected by the Safe-Cabinet Company.

## WHO IS RESPONSIBLE?

Is the architect or engineer, the contractor or the owner responsible for the nature of materials used for surfaces on which people walk or work? Something should be done to make and keep such surfaces safe. The word slip-proof must become as important a word as fireproof in the vocabulary of building construction.

Last year in Manhattan 170 persons were killed by falls on stairs and sidewalks. More than half of the death cases were caused by slipping. Fires caused only 65 deaths in the same year and district. Subways, elevated and surface cars combined killed only 77.

Slippery metal floors and sidewalk inserts, such as door saddles, floor plates, floor elevator landings, coal-hole covers, etc., and unsafe stair treads are dangerous, and they cause uncounted casualties, which cost considerable in accident claims. The casualty insurance companies are charging extra for all such hazards.

The use of slip-proof surfaces where people walk is demanded in the interests of "Safety First," and the constantly growing use of Feralun slip-proof treads for stairs, landings, around machinery, thresholds, steps and running boards, boiler room floors, shipping platforms, elevator sills, and the further employment of Feralun for anti-slip sidewalk and vault lights is a decided step in the right direction.

An interesting little book on "Feralun, The New Material" is published for free distribution by the American Abrasive Metals Company, 50 Church street, New York.

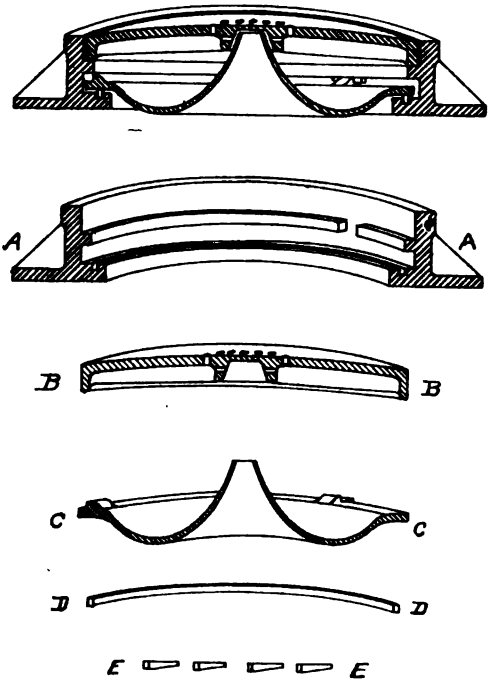
## LARGEST SPRINKLER INSTALLATION.

The Bush Terminal property, borough of Brooklyn, New York, has the largest warehouses and longest piers in the world. The property embraces 7 piers, each a quarter of a mile in length. Blocks of six-story warehouses have storage capacity of 26,000,000 cubic feet. Back of the warehouses are one-story warehouses for cotton, jute, and other fibres, 10 industrial buildings, each six stories in height, some 600 feet in length, others 700 feet, in which are employed more than 10,000 persons.

This building center is protected fully by automatic sprinklers, installation having been made by the "Automatic" Sprinkler Company of America. It constitutes the largest sprinkler equipment in the world, and consists of 110,950 sprinklers inside the building and 3,249 open or outside sprinklers, controlled by 234 dry pipe valves.

## SAFETY MANHOLE DEVICE.

The main object of this device, which is manufactured by the P. David Company, 21st and Indiana streets, San Francisco, is to provide a waterproof and ventilated manhole ring and cover, thus preventing dangerous and costly explosions and short circuits which occur through poor ventilation, and the accumulation of water in underground systems.




**Safety Manhole Device.**

The illustration depicts this device, which promotes safety in underground gas, electric and telegraph work.

The cover (B) has the ordinary curved crown common to all covers of recent practice. The inner pan (C) is provided with an opening, which extends into the crown of the cover (B) so as to be above the level of the ring casting (A). The inner pan (C), being pressed down on the rubber gasket (D) inserted into a groove in the frame (A) by the wedges (E), forms a combination which makes it impossible for water to pass through into the underground system, except in the case of a flooded street, as the inner pan (C) has no opening below the level of the main casting (A), and therefore no opening below the street level.

The outlet in (C), being in the highest possible point in each unit, provides for the escape of heated air and combustible gases and allows for the introduction of fresh, pure air for keeping the system cool.

This Safety Manhole Top aims to supply much needed improvements in underground work; namely, the exclusion of water and the provision for ventilation, the lack of facilities for which have caused the destruction of life and of valuable property.

## MISCELLANEOUS ITEMS.

The Safe-Cabinet Company, of Marietta, Ohio, has established a foreign sales department at 18 Broadway, New York City. This marks another and an important advance in the history of this aggressive company. E. P. & Alfred Neuburg have been appointed managers of the new department. They are men of large practical knowledge and experience in the exploitation of business in foreign fields. The jurisdiction of the department comprises the entire world outside of the United States and Canada, and includes the American dependencies and Alaska.

A report of a fire test to determine the comparative fire-resisting qualities of metal ceilings and plaster ceilings, made at Columbia University's fire testing station, Greenpoint, Brooklyn, has been published by the Associated Metal Ceiling Contractors of Greater New York. Six types of ceiling construction were tested.

To those to whom the fact has been brought home that many so-called fireproof buildings have been destroyed through lack of proper window protection, the literature issued by the Mississippi Wire Glass Company, 220 Fifth avenue, New York, will be interesting reading. Mississippi Wire Glass is made in patterns to suit any condition or any style of architecture, and is designed specially to diffuse the light, thus affording the combined advantages of proper fire protection and the maximum of natural illumination.

"The Protection of a Monarch" is the title of a new publication of the Consolidated Engine Stop Company, Inc., 351 West 38th street, New York. It tells what the Monarch Engine Stop and Speed Limit System does; how it stops automatically the engine on any power unit, if it begins to race; how it stops the engine from any part of the plant when a switch is pushed; how the system proves an economical advantage as a preventer of shut downs, loss of life and damage suits. Views are given of a few of the plants equipped with the system, such as B. B. & R. Knight, Providence; Westinghouse Company, East Pittsburgh; Yale & Towne Manufacturing Company, Stamford, Conn.; Eastman Kodak Company, Rochester; Link Belt Engineering Company, Philadelphia; Brown & Sharpe Manufacturing Company, Providence, and B. F. Goodrich Company, Akron, Ohio. This is a good book for those interested in safety to have on file.

"Window Wisdom," the second of the clever little preachments dispensed at inter-

vals by the S. H. Pomeroy Company, Inc., is not only out, but out and out ahead, if such is possible, of the initial number in the clever combination of wisdom, wit and every-day common sense on fire protection and fire prevention.

The text for this number is "responsibility," and around it the editor has built up an appeal to owners, architects, contractors and building tenants in the interest of more thorough fire-prevention methods. The unusual feature of this little journal is that the article it exploits—the Pomeroy Fire Retardant Window—is kept severely in the back-ground of a discussion of larger subjects which are of vital interest to the business and professional man to whom the booklet is addressed. For instance, in the present number, the Pomeroy window is considered simply as one of many proved fire-resisting and fire-retarding building accessories which are absolutely essential if the fire hazard is to be minimized. After considering "the national ash heap" and the individual drain it makes upon the pocket of every member of the community, the editor proceeds to show how the reduction of this waste is a matter of personal responsibility with every one having to do with building operations. The current number of "Window Wisdom" is severe—but just—in its arraignment of responsibility-shirking citizens in whatever walk in life, and has a personal message to every one in any way concerned with the planning, erection and management of buildings.

In the February number of SAFETY ENGINEERING the first issue of this little periodical of progress was described as "well worth getting." The enjoyment and profit derived from the perusal of this latest arrival prompt advice to get it also. A postal card to the S. H. Pomeroy Company, 296 East 134th street, New York, is the only expense for a year's subscription.

Kreipe & Reinhardt, manufacturers of the Kreipe Punch Press Guard, 123 Liberty street, New York, have introduced a punch press guard which any mechanic can apply to a press, and which is suitable for every operation. The advantages claimed for the guard are that it can be used as a stationary guard, without any change; that it is low in cost, absolutely safe, and does not cause more movements to threadle, and has no spring tension to make the press operator work harder. The company is manufacturing, also, a new drop hammer guard, which works automatically with the hammer, moves the operator's hand out of danger, and is applied easily. Full details are obtainable direct from the manufacturers of the guards.

The Pyrene Manufacturing Company, manufacturer of the well-known Pyrene Fire Extinguisher, has removed its general offices to 52 Vanderbilt avenue, New York. A large, steady increase in the volume of business of this company has necessitated more commodious quarters. The new offices have been laid out carefully to secure maximum efficiency in each department, and ample provision has been made for handling the business in a systematic manner.

## RECENT CATALOGUES OF SAFETY DEVICES AND METHODS

**By writing the firms the publications may be obtained without cost.**
**Please mention SAFETY ENGINEERING.**

### Aero Automatic Fire Alarm.

Aero Fire Alarm Co., 6 Church St., New York.

Fire Prevention, the war-cry of property owners, house dwellers, factory workers, insurance companies and credit associations, receives an assuring answer in "This Is Not a Piece of Copper Wire," It is a tale of a copper tube that is a live wire as a fire finder.

### Accident Prevention Signs.

The Stonehouse Steel Sign Co.,
1129 Seventeenth Street, Denver, Colo.

Folder describing by text and colored illustrations a few of the many Universal Danger Signs which this company makes a specialty of. To universalize a sign it is necessary that all foreigners should understand its meaning, and this is exactly what has been accomplished in the Foreign Language Universal Danger Sign. This company manufactures accident prevention signs of enameled steel, embossed steel and cardboard, and this folder offers many suggestions to those who have sign troubles to solve.

### Asbestos Corrugated Sheathing.

Keasbey & Mattison Co., Ambler, Pa.

To those interested in sheathing that is fireproof and weather-resistant, that affords a simple, economical, effective, efficient roofing and siding for factory buildings, boiler houses, warehouses, train sheds and other structures of many types; this new publication will prove interesting reading. It is a book that explains what Ambler Corrugated Sheathing is and what it will accomplish, a publication that should be in the library of all interested in fireproof construction.

### Hardy Welding Glass.

F. A. Hardy & Co.,
10 So. Wabash Ave., Chicago, Ill.

Descriptive booklet of a welding glass in which the light-proof eye cups are made of a substance that is a non-conductor of both heat and electricity. Other features of this glass are: The Noviweld lense used, absolutely keeps every harmful ray of light from passing through them to the eyes; while affording the greatest possible amount of illumination; the glass is fully ventilated and supplied with perspiration outlets, and the lenses are easily changed. This firm publishes booklets describing many types of safety glasses manufactured by them.

### Safe Home Match.

The Diamond Match Co.,
111 Broadway, New York.

The Safe Home Match, a real American safety match, manufactured only by the above company and inspected and labeled by the Underwriters' Laboratories and which is destined to play an important part in fire prevention; is fully described in a little folder just issued. Some of the strong safety features of the match are: it strikes anywhere, does not spark nor sputter and burns evenly; it is obnoxious to rodents and is made to conform to the severe requirements of the American climate; once blown out, it stays out, as it is chemically treated to prevent afterglow; it is non-poisonous, and contains no white phosphorus.

# UNDERWRITERS' LABORATORIES'

## Recent Approvals and Reapprovals

**The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.**

**The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.**

ASBESTOS SHINGLE ROOF COVERINGS. Johns-Manville Co., H. W., Madison Ave. and 41st St., New York, N. Y. J-M Transite Asbestos Shingle Roof Coverings, Laid American Method.

ASBESTOS SHINGLE ROOF COVERINGS. Johns-Manville Co., H. W., Madison Ave. and 41st St., New York, N. Y. J-M Transite Asbestos Shingle Roof Coverings, Laid French Method.

CABLES, ARMORED. Smurr & Kamen Co., Mfr., 313 N. Whipple St., Chicago, Ill. Marker: A green cord parallel with outer braid and armor.

CINEMATOGRAPH PROJECTOR. Pathescope Co. of America, The, Submittor, 33-35 W. 42d St., New York, N. Y. Mfd. for the above by Compagnie Generale de Establishments Pathe Freres (Pathe Freres), mfr., Vincennes, Republic of France. Popular Model "Pathescope," a portable motion picture machine having for its illuminating element a 12 V. lamp in series with a current limiting rheostat and provided with necessary portable cord and attachment plugs for use on ordinary lighting circuits. Rating 2 A., 120 V. A special slow-burning film is supplied for use with this equipment.

DISCHARGE DEVICES, HAND-OPERATED. American Oil Pump & Tank Co., The, mfr., Central and Kindel Aves., Cincinnati, Ohio. One gallon cylinder capacity, vertical, double-acting pump, Cut No. 1. Single acting pump, Cut No. 9-A. Less than one gallon cylinder capacity, vertical, single-acting pumps. Cut No. 16 and Cut No. 30. Less than one gallon cylinder capacity, horizontal, double-acting pump. Cut No. 4.

DOOR FRAMES, METAL. Metallic Roofing Co. of Canada, The, Ltd., Mfr., King and Dufferin Sts., Toronto, Canada. Frames for Single Swinging Doors Mounted Singly or in Pairs. These frames are standard for mounting single swinging doors in openings in corridor or room partition walls and for use in walls of vertical shafts in openings not exceeding 48 in. in width and 96 in. in height for single doors and 72 in. in width and 96 in. in height for doors in pairs.

DOORS AND SHUTTERS, METAL. Merchant and Evans Co., mfr., 2019 Washington Ave., Philadelphia, Pa. Evans' "Almetl" sliding fire door for openings in fire walls. Door made of two sheets of corrugated, galvanized sheet steel stiffened at edges by a steel frame. Corrugations horizontal on side next to wall and vertical on other side. One-eighth inch asbestos board between corrugated sheets.

DOORS AND SHUTTERS, METAL-CLAD. Kornbrodt Kornice Co., Mfr., 1811 Troost Ave., Kansas City, Mo. Tin-clad fire doors and shutters, constructed in accordance with the requirements of the National Board of Fire Underwriters. Designed for protection of openings in walls and partitions.

DOORS AND SHUTTERS, METAL-CLAD. Metallic Roofing Co. of Canada, The, Ltd., Mfr., King and Dufferin Sts., Toronto, Canada. Corridor and Partition Door.

DOORS AND SHUTTERS, METAL-CLAD. Steinberg, Jacob, Mfr., 229 Balmoral Ave., Newark, N. J. Tin-clad fire doors and shutters, constructed in accordance with the requirements of the National Board of Fire Underwriters. Designed for the protection of openings in walls and partitions.

FIXTURES. Sunlight Reflector Co., Mfr., 143 Court St., Brooklyn, N. Y. Sunlight Show Window Reflector. A sheet metal body with corrugated mirror reflectors and having main wires and taps to sockets with slow-burning insulation. Made on order specifying length of fixture and number and spacing of lamps.

FIXTURES. Benjamin Electric Mfg. Co., mfr., 120-128 S. Sangamon St., Chicago, Ill. Show case or window reflector consisting of metal troughs, special double-ended receptacles for tubular lamps, and terminal connecting blocks permanently wired with No. 14 B. & S. gauge slow-burning wire, enclosed in flanged sides of reflector.

FIXTURES. Deschere & Co., Harvey, mfr., 1507 Garden St., Hoboken, N. J. Plaque Type Argus Miniature Electric Sign. A miniature electric sign consisting of a cast aluminum base with non-interchangeable letters illuminated with low-voltage miniature lamps connected in series and shunted with proper resistance units within the base, for use on ordinary lighting circuits. Provided on order with portable reinforced or armored cord and attachment plugs or arranged to be wired at an outlet as a permanent chain fixture. Rating 5 A. 115 V.

FIXTURE WIRE. Goodyear Rubber Insulating Co., The, mfr., 105 E. 131st St., New York, N. Y. Marking: Two green and one red threads laid parallel to wire, between rubber insulation and braid. Rubber-covered wires shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters, and examined at factories and passed by Underwriters' Laboratories, Inc., have labels attached to each coil.

HEATERS, ELECTRIC. Westinghouse Electric & Mfg. Co., Mfr., East Pittsburgh, Pa. Portable Heating Devices. Radiators, 100-250 V., 1000-6000 W., Type C, Non-Luminous. Non-Portable Heating Devices. Bayonet Type Water Heater, Type A, 100-125 V., 4.5-10.5 KW., Styles 186054-186149 incl.

PICTURE MACHINES AND APPLIANCES. Atlas Educational Film Co., Mfr., 5 S. Wabash Ave., Chicago, Ill. Atlas Special Portable Hand-Operated Picture Machine. The electrical parts of this device comprise an incandescent lamp of special form with socket and portable cord for attachment to supply circuit.

WINDOWS. Mesker Brothers Iron Co., mfr., Sixth, Poplar and Seventh Sts., St. Louis, Mo. Double hung window (knock-down type).

WIRES, MISCELLANEOUS. Chicago Insulated Wire & Mfg. Co., mfr., Sycamore, Ill. Flexible cable having slow-burning insulation, for use with picture machines. Marker, two brown threads, woven parallel in inner braid.

"THE MAGAZINE OF SAFETY"

# SAFETY ENGINEERING

SAFETY ECLIPSING DANGER

January 1915

25 Cents

## *Broadening the Scope of the "Magazine of Safety"*

*Safety Engineering's Plans for 1915.*
*What Its Readers and Advertisers Say.*
*See Advertising Section Pages 6, 7, 18, 19*

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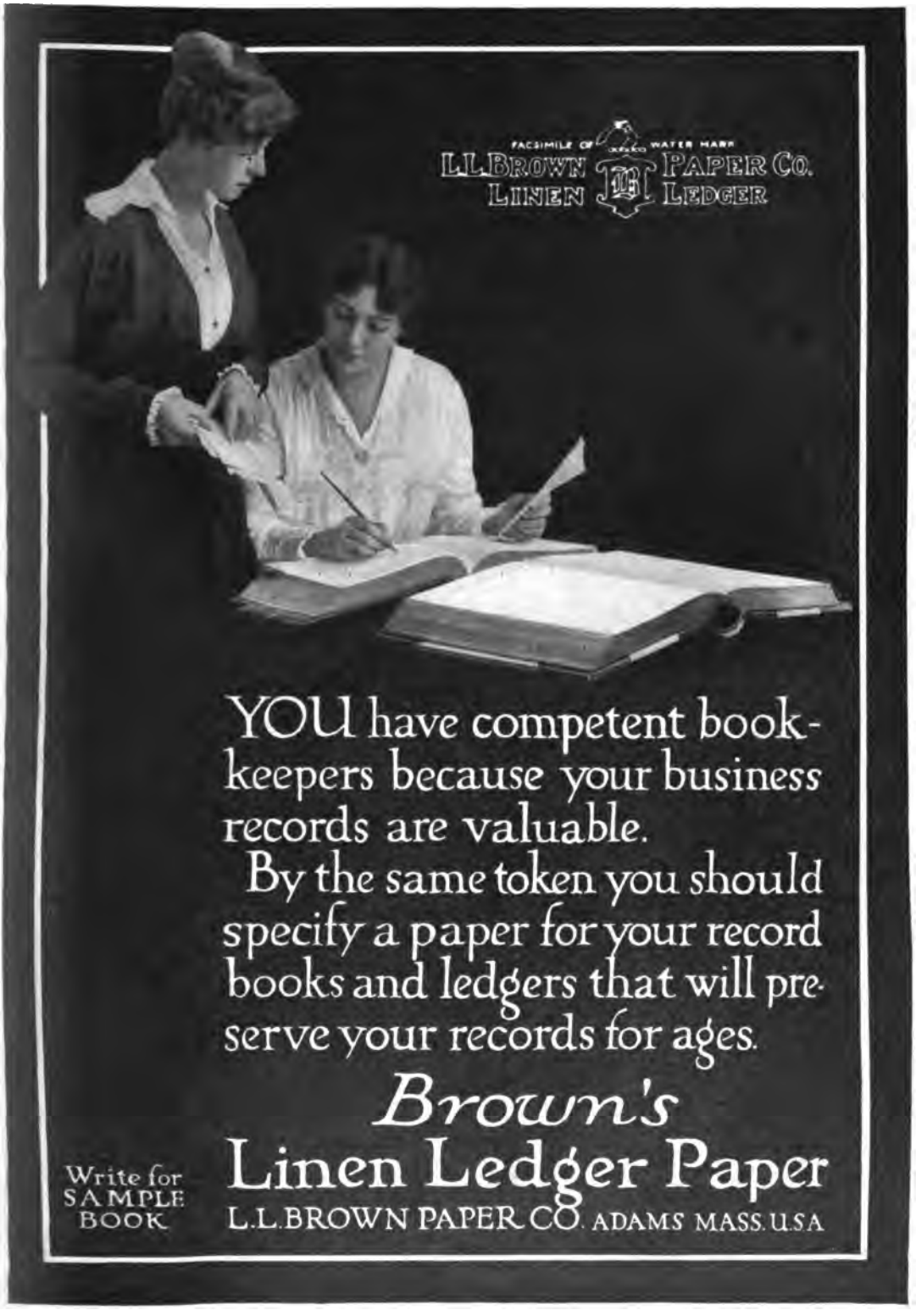
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is standard in these fields; standard because more than half a million of them have made good in actual service.

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## THE PULMOTOR

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### Department of Public Safety
**DIVISION OF FIRE**

The Draeger Oxygen Apparatus Co.,
Pittsburgh, Pa.

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Gentlemen:

On last Sunday, May the 16th, we had a call for the Pulmotor from Alton & Hubbard Streets, this city. After we arrived we found that Edgar Vess, aged 6 years old, had played with a live wire that carried 2200 volts. His hand was burnt to the bone and also a hole in his head. He was not breathing, but had a faint heart action. I personally applied the Pulmotor and within five minutes we had him breathing and then we applied a little oxygen and he soon began to breathe natural; he did not regain full consciousness until 8 o'clock Sunday night and this happened at 12 o'clock noon. Dr. McClutchion makes the claim that the Pulmotor saved his life and I am satisfied that it did.

This one case was worth more than the cost of 100 Pulmotors and everybody is pleased with its work. I can heartily recommend it to any City to have at least one in the Fire Department. You can refer to me at any time. You can use this letter any way you wish.

Yours very truly,

Arthur Schungst.

Chief Fire Department.

The Pulmotor will accomplish what nothing else can in saving human life and that is why it is a requisite of every safety department—yours included.

Its presence may be needed any moment. Its lack may cost human life. Investigate The Pulmotor today. There are more than 4000 in use and each has saved more than one life.

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# Safety Engineering

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FRANKLIN WEBSTER, Editor
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# A SCHOOL MADE SAFE WITH PYROBAR

"Scott" High School Building, Toledo, Ohio. C. N. Nordhoff, Architect for Board of Education.

Maximum efficiency and economy—used in countless public buildings of the first class. Scientific tests—official approval such as that of the National Board of Fire Underwriters—these are some of the reasons for the swiftly growing popularity of

## PYROBAR GYPSUM TILE

**Economy**

In labor and many ways, and particularly in deadload saving. Pyrobar is 40% lighter than Terra Cotta Tile.

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Pyrobar has been proved (by researches of the Lewis Institute, Chicago) 60% more soundproof than Terra Cotta Tile.

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**205 West Monroe Street, CHICAGO**

*New York* *Cleveland* *Kansas City* *Minneapolis* *San Francisco*

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*Remember You Saw It in Safety Engineering.*

# The man who didn't

# The man who did

## Wear Saniglas Eye Protectors

***Why take chances with substitutes?***

Julius King Optical Company

10 Maiden Lane, New York
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INSPECTED LIGHT WEIGHT SAFE No

**THE ONLY SAFE** that has ever been approved by the UNDERWRITERS' LABORATORIES, Inc., (Acting for National Board of Fire Underwriters)

Two years ago the Underwriters classed THE SAFE-CABINET (1913 Model) as an "Insulated Cabinet". Today the S-CIENTEST MODEL of

# THE SAFE-CABINET

is labelled by the same high authority as a *SAFE*. A Safe in protection—a Cabinet in appearance, weight and convenience—THE MODERN SAFE.

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A Light Weight Container, offering the protection of a heavy iron safe, *but in cabinet construction,*—this was the idea *originated* and *perfected solely* by

**THE SAFE-CABINET CO.**

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***Johns-Manville Service is an evolution—the growth of half a century's endeavor to insure permanent satisfaction to users of J-M Products, of whatsoever kind. The sale of an article is not the end, it is really the beginning of J-M Responsibility.***

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This is not mere "selling talk," it is a statement of fact backed up by the performance of hundreds of J-M Asbestos Built-up Roofs in effective service for many years and still good for as many more.

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Being fibrous in structure it is able to withstand lateral and longitudinal strains and can be nailed or screwed fast to studding like wood itself.

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# War has brought galvanized Corrugated Iron Roofing cost close to J-M Corrugated Asbestos Roofing

## But Nothing can make it give the Same Efficient Service or make it last as long.

As J-M Corrugated Asbestos Roofing consists of a heavy sheet metal reinforcement hermetically sealed in waterproofed Asbestos fabrics by Trinidad Lake Asphalt compound, it ordinarily costs somewhat more than galvanized corrugated roofing and siding.

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An ideally durable roofing and siding for every building of permanent character in any class of service. For it is waterproof, fire-retardant and practically everlasting.

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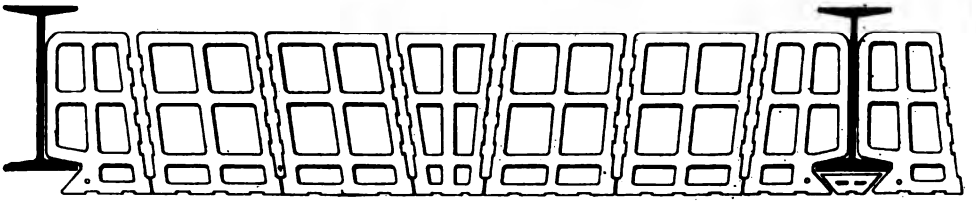
## "Simplex" Hollow Tile

### is the standard material for fireproof construction

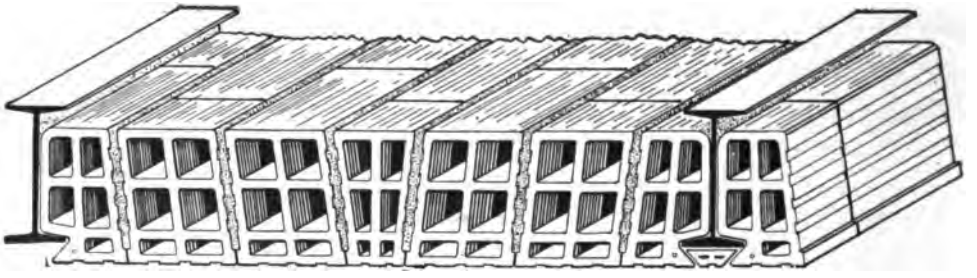
Maurer Hollow Tile products established a standard of excellence many years ago. "Simplex" Hollow Tile is the latest Maurer product.



**"Simplex" Method Hollow Tile Flat Floor Arch—Spaces Between Tiles For Cement Filling.**

## *Its advantages are*

**Resists Fire and Moisture Soundproof Light Weight**
**Can be erected during freezing weather**
**Costs 40% less to install**
**Insures Better Workmanship and Speed in Construction**



**"Simplex" Flat Arch—Joints Between Tiles Filled With Cement.**

Simplex Hollow Tile is the most important and valuable addition in fireproof construction made in many years.

Manufactured exclusively by

**Henry Maurer & Son, 420 E. 23rd St., New York**

POLISHED "WIRE GLASS"

# MISSISSIPPI "Wire Glass"

## *The Recognized Standard*

Homogeneous and Solid with an average of less imperfections than, and equal in strength to, any of the sub-standard products on the market. Made in patterns to suit any condition or style of architecture. Specially designed to diffuse the light, thus affording the combined advantages of proper fire protection together with the maximum of natural illumination.

"Wire Glass" properly glazed in approved metal frames furnishes the maximum of efficiency for protection of window openings against fire

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**REDUCE**

**Fire Hazard, Maintenance Costs, Insurance Rates.**

**INCREASE**

**Light, Efficiency of Employees, Quality of Manufacture, Safety of Humanity and Investment.**

Install "Wire Glass" made by the

## Mississippi Wire Glass Co.

**220 Fifth Ave., New York**

**7 W. Madison St.**
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**4070 N. Main St.**
**St. Louis, Mo.**

# Fire-resistive Construction

was one of the important subjects discussed at the recent Annual Meeting of the

**N. F. P. A.**

a report of which meeting appears in this magazine. Those interested in Fire Resistive Construction will do well to investigate.

# Troegerlith

## Composition Flooring

"a tested, tried and proved Fireproof Material which more than meets the requirements of building and insurance codes,"

*saved this building from burning down*

**Troegerlith Composition Flooring**

is sanitary, water-repellent, very easy on the tread, most durable, costs little more than a wooden floor, less when period of service is considered, and affords Dustless, Germ, Slip and Waterproof floors; in fact

**No Floor Protects As one of Troegerlith Flooring**

***Send for Illustrated Booklet Describing***

**TROEGERLITH Composition Flooring**

and Cork Composition Flooring, safe, light and lasting materials, possessing all the virtues required for a perfect floor.

**TROEGERLITH TILE CO.**
Manufacturers
**103 Park Avenue, New York**

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Saved by Troegerlith Composition Flooring

# SOLID STRONG SERVICEABLE

## SOLID WIRE GLASS
**made by**
## THE CONTINUOUS PROCESS

PENNSYLVANIA WIRE GLASS CO. PHILADELPHIA APPROVED SOLID WIRE GLASS FIRE RETARDANT NY 76 TRADE MARK NEW YORK UNDERWRITERS' LABORATORIES IDENTIFICATION

**For the Safety of the Public.**

Offers the greatest protection against fire, the largest immunity from the hazards of breakage, and the most even and effective distribution of light. Our plant and experience are at your disposal.

**PENNSYLVANIA WIRE GLASS COMPANY**
**Philadelphia** **New York**

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**Placed where you want it—on top of building—through the building—in a court—straddle a building—straddle an alley or driveway. We make them to fit your location.**

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MEANS
# SAFETY FIRST
WITH
# WIRE GLASS

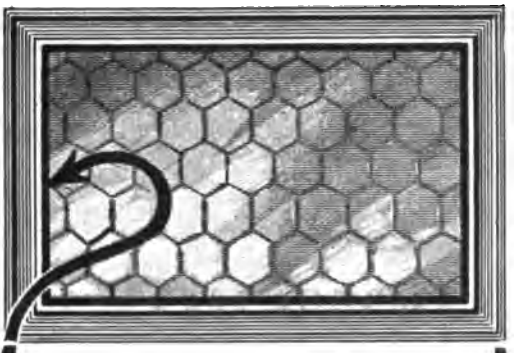
In purchasing **wireglass** it should be remembered that the highest quality will afford protection against the spread of fire impossible in inferior glass. If you need **wireglass** you need the highest quality. You cannot afford any other with safety. WESTERN wireglass in strength, grade and quality is surpassed by none.

Look for the three twist at the vertical strand. This is our distinguishing mark as authorized and approved by the Underwriters' Laboratories.

## WESTERN GLASS CO.

*Manufacturers of High Quality*
*WIREGLASS*

**STREATOR, ILLINOIS**



*Fire Prevention Experts Demand*

## *JOHN MARX FIRE RESISTING PUTTY*

*In Wireglass Windows*

### JOHN MARX FIRE RESISTING PUTTY

**Approved By**
**Underwriters' Laboratories, Inc.**

***Will double the durability of your Fireproof Windows***

Ordinary putty should never be used in wireglass windows.

John Marx Fire Resisting Putty overcomes all the objections fire preventionists have against ordinary putty.

Resists for indefinite periods all conditions of actual service; withstands exposure to high temperatures; remains in the grooves after exposure to severe fire and subjection to action of fire-hose streams.

Post yourself on the best putty for all glazing purposes. Send for descriptive folder and list of buildings where "John Marx Putty" has proved its worth.

**Manufactured by**
**JOHN MARX**
**54-56 Paterson Ave., Hoboken, N. J.**

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The use of, and emphasized the necessity for, reliable hollow metal fire-retardant windows, at the annual meeting on May 11th to 13th in New York City. The fire-resistant advantages of these windows are no longer questioned.

# POMEROY Hollow Metal Fire-Retardant WINDOWS

Have long enjoyed the confidence and approval of owners, architects and builders—concretely expressed by the use of thousands of Pomeroy Windows in hundreds of high-class buildings. They represent an experience of more than twenty years in window construction and embody every up-to-date improvement approved in practise.

Rogers Peet Company's Building, New York—fitted throughout with Pomeroy Windows.

## The POMEROY Line

Includes twenty-seven standard window types, affording architect and owner an unequaled opportunity for choice in a standard construction of demonstrated superiority. Exceptional care in design and manufacturing, and production methods unique in the window world, enable the Company to maintain a uniformly high quality not elsewhere to be had.

***"An Ounce of Protection Is Better Than a Ton of Indemnity."***

National Cloak and Suit Company's Building, New York—a Pomeroy-equipped building.

## THE LATEST POMEROY WINDOW

Is the Heavy-Gauge Double-Hung Fire-Retardant Window, made of steel about three times as heavy as that required by the National Board of Fire Underwriters. It is designed to take the place of the copper-kalameined construction commonly used for street fronts, with the advantage of greater serviceability at lower cost.

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**NEW YORK**

**Sales Office**
**30 East 42nd Street**

# LOWE "AUTOMATIC" FIRE DOOR RELEASE

**Operated on a new principal of FIRE DETECTION. It assures the closing of a fire door before a fire can get within 25 feet of the opening and eliminates the possibility of a fire passing through the opening, as is the case with the ordinary fuse link.**

**This device is approved by the Underwriters Laboratories. It is the quickest known detector of fire and insures the maximum of Fire Door Efficiency. It is small, self-contained, mechanically and automatically operated. Simple to install and requires no attention thereafter.**

***Send for descriptive booklet***

## "AUTOMATIC" SPRINKLER CO. OF AMERICA

**SPECIALISTS IN FIRE PROTECTION**

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**DEPARTMENT OFFICES IN LARGE CITIES**

Latch "C" Device.

## SAFE FOR PERSONS AND PROPERTY

This device is being adopted extensively for doors that are kept wide open during the day. It works automatically by heat, but as it has to be open all of the time to its fullest extent unless closed by fire it meets the requirements of the state authorities as well as the insurance people.

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## GEO. T. McLAUTHLIN CO.

**120 FULTON STREET, BOSTON**

Largest manufacturers in New England of

## FIRE DOORS AND SHUTTERS

Equipped with self-closing device insuring positive closing in case of fire.

APPROVED BY NATIONAL BOARD OF FIRE UNDERWRITERS AND N. E. INSURANCE EXCHANGE.

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They are made in all styles, are glazed with Wire Glass, absolutely fire-proof. Prices quoted on application.

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MANUFACTURERS

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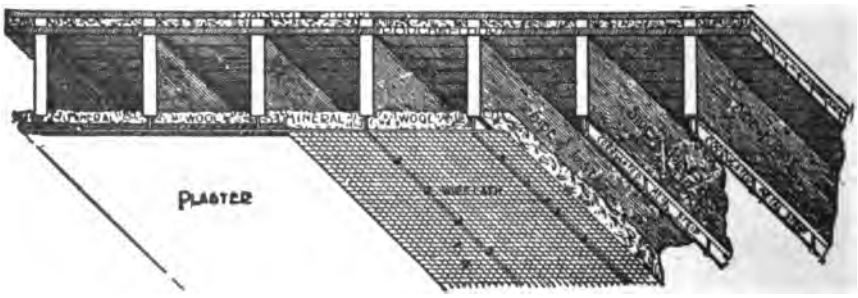
**SEMI-FIRE PROOF CONSTRUCTION FOR CEILINGS, PARTITION**
By the use of Mineral Wool applied as shown on cut below.




*Samples and Circulars Free.*

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**140 Cedar Street, New York**

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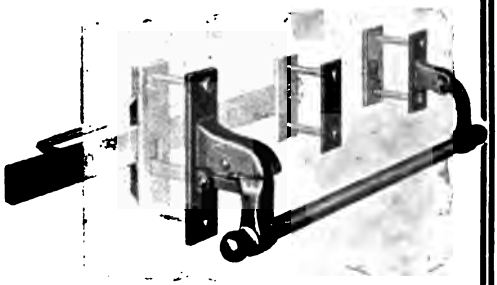
*"To minimize the Panic Hazard in Theaters and Halls approved panic bolts must be installed on exit and fire doors," states Lieutenant John J. T. Waldron, in charge of Division of Places of Public Assembly, Fire Department, New York.*



**PETERS' PANIC FIRE DOOR LATCH**

operating by slight pressure against the crossbar, meets exactly the above requirements. Positive in action, no springs or attachments to get out of order, made of a combination of malleable and wrought iron, it

**Insures Safety First in Time of Fire Panic**

*Send For Illustrated Literature*

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1934-38 N. Front St. Philadelphia, Pa.

New York Agent, Henry Frank, Jr., 372 Hudson St.

# PROTECTION

From Fire

# ASSURED

If You Use

# KINNEAR

## STEEL ROLLING FIRE DOORS AND SHUTTERS

THEY ARE APPROVED

***Write for Catalog***

## The Kinnear Mfg. Co.

COLUMBUS, OHIO

# Fire-Resistive Construction

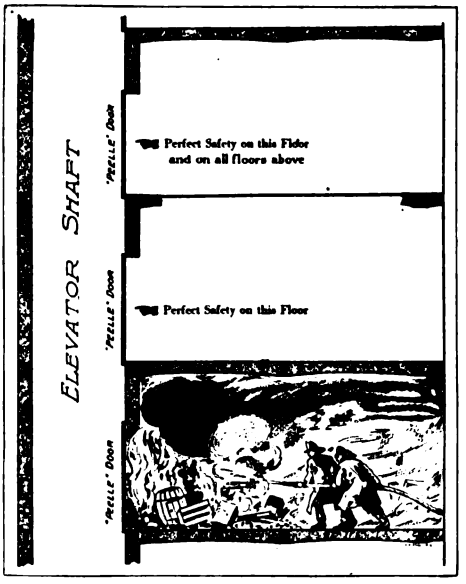
***is made doubly effective where* each floor is an individual fire unit.**

# PEELLE

***Truckable Counterbalance Fireproof Freight Elevator***

# DOORS

**produce this desirable condition as shown by illustration below**




**Peelle Doors**

Take the place of the old-time swing doors combined with safety gates.

Operate inside of elevator shaft, occupying no valuable floor space.

Always closed, making all openings **accident proof** and **fireproof.**

***Increase Elevator Efficiency 50 Per Cent***
***Specified by Leading Architects***

**THERE IS NO EQUAL**

**Details furnished on request**

## The Peelle Co., New York

Boston Philadelphia Cleveland Chicago

# "SAFETY FIRST" IS OUR MOTTO!!

**First!!**

**Last!!!**

**All the Time!!!!**

We Save Your Property

We Reduce Your Insurance Costs

We Perpetuate Your Plant

**Will You Hear Us For Our Cause?**

*If So Write To*

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## ABSOLUTELY AUTOMATICALLY ASSURED

***The Fire peril will be averted in your factory, office or residence by the installation of the***

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**Included in list of Fire Appliances Published by National Board of Fire Underwriters**

***Endorsed by Fire Office Committee of Great Britain, 1906***

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**Investigate "Aero" Fire Protection. It is the most efficient least costly method you can install.**

## AERO FIRE ALARM COMPANY

**6 Church Street, New York.**

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FOR PRIVATE ESTATES, TOWNS,
MANUFACTURING PLANTS AND INSTITUTIONS

Warehouse Type

Truck Type

SIMPLE
DURABLE
EFFECTIVE

A Highly Efficient

**One Man Fire Department**

MANUFACTURED BY

## BADGER FIRE EXTINGUISHER CO.

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KEYLESS
AUX. FIRE ALARM BOX
SIZE 4X6 IN.

IN CASE OF FIRE BREAK THE GLASS AND PULL RING DOWN. HOLD DOWN FOR "RETURN SIGNAL" FROM THE STREET BOX IN MOTION.

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**Manufacturers and Contractors for Over 57 Years of**

## Fire Alarm and Police Signal Telegraphs

Complete systems installed for municipal service, controlled by central office apparatus, and operated by storage battery, fitted with all the latest up-to-date appliances.

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NEWTON UPPER FALLS, MASS.
NEW YORK OFFICE, SUITE 5708, GRAND CENTRAL TERMINAL.

**Be Sure and Visit The**

## Universal Safety Exhibit, Panama-Pacific Exposition

## NEWMAN CLOCK COMPANY

Makers of Watchman's Clocks for Forty Years.

New York — Chicago — Montreal — London — Geneva

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**No matter what your needs, and always of the same high standard for which this, the largest Fire Apparatus Plant in the World—that has built 90 per cent. of all heavy fire department apparatus—has been noted during more than 71 years of successful manufacture of fire protection equipment.**

## *Indispensable*

**for Industrial Plants, Towns, Institutions and Private Estates.**

AMERICAN-LAFRANCE

## Chemical Fire Engines

Save Water Damage; Take Up Little Space; Always Ready for Immediate Service; Light; Easily Moved; Simple in Design and Operation. Get into Service Quickly and Extinguish Fires with Dispatch.

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New York—Whitehall Bldg., 17 Battery Place. Chicago—815 South Wabash Ave. Boston—1113 Commonwealth Ave. Portland, Ore.—16th and Marshall Sts. San Francisco—151 New Montgomery St. Atlanta—1633 Chandler Bldg. Dallas—2004 Live Oak St. Denver—304 Jacobson Bldg. Cincinnati—338 W. 4th Ave.

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APPROVED FEB. 15th, 1902.

THERE ARE OVER 2000 USED BY THE

**PANAMA CANAL**

40 GAL. COPPER TANK CHEMICAL ENGINES FOR HOTELS AND FACTORIES.
CHEMICAL TANKS BUILT SPECIAL FOR FIRE DEPARTMENT APPARATUS.

**O. J. CHILDS COMPANY - - UTICA, N. Y.**

MANUFACTURERS FIRE APPARATUS

**Be Sure and Visit The**

## Universal Safety Exhibit, Panama-Pacific Exposition

# THE NEWMAN GRILLE MODEL WATCH-CLOCK

2 **Safeguards the UNDERWRITERS' LABORATORIES—Chicago.**

# What's in a Name?

**There have been "Safety Matches" on the market for years, but not till Science, Research and Efficient American Industry produced the**

**SAFE**

**HOME**

was a match produced that could be truly classified as a "Safety Match" and adapted to the peculiar atmospheric conditions *existing in this country.*
The Safe Home Match is made by The Diamond Match Company, who were awarded a Grand Prize last December by the American Museum of Safety for Meritorious Product and *Excellent Factory Conditions and Processes.*
The Safe Home Match is *inspected and labeled by the Underwriters Laboratories,* who operate under the direction of the National Board of Fire Underwriters.

**THE TRUE PIONEER SAFETY MATCH**
**SAFE HOME**
Made Only By
**The Diamond Match Company**

"Feralun" Slip-Proof Treads
Prevent Slipping Accidents

# Mottoes *vs.* Action

**"Safety" slogans don't remove dangers. You can't paper your office with mottoes and expect accidents to cease.**

## You Must Act

**If you really want to prevent accidents in *your* plant —if you want to eliminate the greatest hazard—**

## Use "Feralun"

**It is doubly safe—It prevents slipping accidents and it's fire proof.**

***Send for sample and description***

AMERICAN ABRASIVE METALS COMPANY
50 CHURCH STREET, NEW YORK.

# Barrett Specification Roofs

*Photo by Engineering News, N. Y.*

*Storehouse of*
*Naumkeag Steam Cotton Company, Salem, Mass.*
*Builders—Eastern Expanded Metal Co. Engineers in charge of this building are now organized as N. E. Concrete Construction Co., Boston, Mass.*
*Roofing Contractors—Warren Bros., Boston, Mass.*

## *In the path of the great Salem fire—*

THIS warehouse was in the centre of the great Salem fire of 1914 which swept over 250 acres of the city. It was built of reinforced concrete and roofed along the lines of The Barrett Specification. In the fierce path of flame, the rain-water conductors and the zinc flashings at the edge of this roof were melted down, but the roof itself was left intact.

After the fire the building stood, ready for immediate use, among the prostrate ruins of its neighbors. The fire underwriters in their official report said:

*"The flames and smoke were driven toward these from a burning area extending over a mile back and a third of a mile in width and swept these mills along their exposed front of about a quarter of a mile in length with a heat which no ordinary construction could withstand."*

The test was a triumph for reinforced concrete and this type of roofing. No wonder Barrett Specification Roofs take the base rate of fire insurance!

Barrett Specification Roofs are not expensive. In fact, they are the least costly of any permanent roofing; they cost nothing to maintain, for they require no painting, coating, or tinkering.

### *Special Note*

We advise incorporating in plans the full wording of The Barrett Specification in order to avoid any misunderstanding. If any abbreviated form is desired, however, the following is suggested:

ROOFING—Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified and subject to the inspection required.

We should like to send every architect, engineer and building owner a copy of the Underwriters' Laboratories report on Barrett Specification Roofs. Address our nearest office.

BARRETT MANUFACTURING COMPANY

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas City Minneapolis Salt Lake City Seattle

THE PATERSON MFG. CO., Limited: Montreal Toronto Winnipeg Vancouver St. John, N.B. Halifax, N.S. Sydney, N.S.

**Prevent Accidents in Unloading Dump Cars**
use the
**HESSTEEL Automatic Safety Ratchet WRENCH**
Designed and Built to stand gross abuse and give long service.
**Write today for descriptive circular.**
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## THE E. HOWARD CLOCK CO. Boston, Mass.

The very latest thing in a watchman clock record. Entire record sheet always visible at once. Can be used without change from Saturday to Monday, or over a holiday, and a clear record secured.

**Please write any of our offices, Boston, New York or Chicago, for particulars, or address E. A. Bigelow, Treasurer, 373 Washington St., Boston, Mass.**

**THE CLEVELAND MAGNETO**

The Clock of Merit used by the U. S. Government, Railroads, large corporations and buildings. Approved by all Insurance Bureaus.

Manufactured by
**THE AMERICAN WATCHMAN'S TIME DETECTOR CO.**
Main Office and Factory, 3403 Perkins Ave., Cleveland, O.

HEADQUARTERS FOR ELECTRIC & PORTABLE
**WATCHMAN'S CLOCKS**
E. O. HAUSBURG, 45 MAIDEN LANE N.Y.
WRITE FOR CATALOGUE AND PRICES

**BE SAFE**

**READ SAFETY ENGINEERING**

# THE NEWMAN GRILLE MODEL WATCH-CLOCK

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**National Forestry In Montana**
By FRANK R. INGALSBE.

**Cost of Initial Mining Evcavations**
By EUGENE D. GARDNER.

**Features of the Electrical Equipment for the Granite Mountain Hoist**
By G. B. ROSENBLATT.

## JOURNAL OF THE ASSOCIATION OF ENGINEERING SOCIETIES

$3.00 per year. MAY, 1915. 30 cents per copy.

JOSEPH W. PETERS, Secretary, 3817 OLIVE ST., ST. LOUIS, MO.

**Be Sure and Visit The**
## Universal Safety Exhibit, Panama-Pacific Exposition

# COMPENSATION INSURANCE AND PREVENTION OF ACCIDENTS

The compensation policies of The Travelers Insurance Company afford the most complete coverage, satisfying the responsibilities of the insured under the compensation law.

These policies also provide as the result of over twenty years' experience an unequaled service of inspection and safety engineering for the prevention of industrial accidents in plants as diversified as a list of American industrial achievements.

In 1914 The Travelers made over 162,000 inspections for the elimination of industrial accidents.

## TRAVELERS' SERVICE PROVIDES:

INVESTIGATION OF PLANTS AND EQUIPMENT,
ADVICE AS TO THE ELIMINATION OF DANGER POINTS,
INSTALLATION OF EFFICIENT AND ECONOMIC SAFETY DEVICES,
HANDLING AND STORAGE OF MATERIALS,
FACTORY METHODS AND SUPERVISION.

***The prevention of accidents is the most essential factor in reducing the cost of compensation insurance.***

The Travelers is the greatest accident and compensation Company in the world.

## THE TRAVELERS INSURANCE COMPANY
**HARTFORD, CONN.**

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# STEAM BOILER INSURANCE

A Steam Boiler policy in The Travelers Indemnity Company carries with it an inspection service of the highest order. It entitles the insured without further cost to analysis of troublesome feed waters and to expert advice upon any problem that may arise in the boiler plant. Also insures prompt adjustment and liberal indemnity in case of explosion.

## THE TRAVELERS INDEMNITY COMPANY
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*Do you know where to turn for efficiency engineers?*

# INSURANCE

is the principal business of the Hartford Fire Insurance Company, but the "Hartford" furnishes not only indemnity but also efficiency service covering

**FIRE PROTECTION**
**MAINTENANCE**
**CONSTRUCTION**
**SPECIAL HAZARDS**
**RATES AND FORMS OF CONTRACT**

As a business man you have made your plant and equipment efficient, but are you getting all you can from your fire insurance? We can tell you and will tell you without charge. Use the coupon.

# HARTFORD FIRE INSURANCE CO.

**HARTFORD, CONN.**

THE HARTFORD FIRE INSURANCE CO. HARTFORD CONN.

**THE HOME OFFICE WILL PUT YOU IN TOUCH WITH THE HARTFORD AGENT IN ANY CITY.**

*Tear off and paste on your letter head*

**Hartford Fire Insurance Co.**
**Hartford, Conn.**

Please send particulars of your plan for making fire insurance more efficient to the address on the margin.

**THE LEADING FIRE COMPANY OF THE WORLD**

ROYAL INSURANCE COMPANY LIMITED

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**New York Office, 84 William Street.**

***For Safety Insurance***
***Subscribe to***
## *Safety Engineering*
***$3.00 a Year***

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THE HOME
INSURANCE COMPANY
NEW YORK

ELBRIDGE G. SNOW, President

| | |
|---|---|
| Cash Assets, January, 1915 | $35,313,539.27 |
| Reserve as a Conflagration Surplus | *2,000,000.00 |
| Cash Capital | *6,000,000.00 |
| All Other Liabilities | 16,610,065.11 |
| Net Surplus | 10,703,474.16 |
| Surplus as regards Policy-Holders, January, 1915 | *18,703,474.00 |

Main Offices, 56 Cedar Street

CONFLAGRATION PROOF

Marine
Automobile
Windstorm
Parcel Post
Registered Mail
Sprinkler Leakage

FIRE

Tourists' Baggage
Use and Occupancy
Commissions
Profits
Rents
Hail

FIRE PREVENTION

SERVICE TO AGENTS AND PROPERTY OWNERS

DEP'T OF IMPROVED RISKS

ENGINEERING AND INSPECTIONS

CONSULTATION AND ADVICE, GRATIS
CORRESPONDENCE SOLICITED

[FIRE]

German American
Insurance Company
New York

STATEMENT JANUARY 1, 1915

CAPITAL
$2,000,000
RESERVE FOR ALL OTHER LIABILITIES
10,456,710
NET SURPLUS
9,033,913
ASSETS
21,490,623

1849 1914

# Springfield

## Fire and Marine

# Insurance Company

SPRINGFIELD, MASSACHUSETTS

**LARGEST FIRE INSURANCE COMPANY**

*CHARTERED BY THE STATE OF MASSACHUSETTS*
*INCORPORATED 1849 CHARTER PERPETUAL*

**CASH CAPITAL $2,500,000.00**

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LOSSES PAID SINCE ORGANIZATION.....$58,525,255.78

*"An agent is known by the companies he keeps"*

# Continental Insurance Company

OF NEW YORK

**THE BEST COMPANY FOR A POLICYHOLDER IS THE BEST COMPANY FOR AN AGENT**

HENRY EVANS, President

HOME OFFICE
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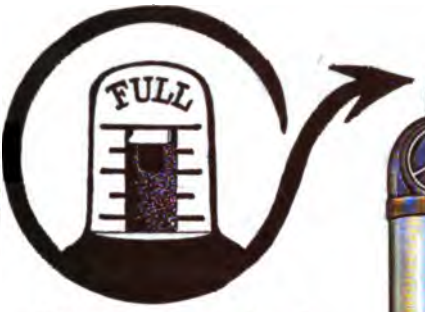
332 So. LaSalle St., Chicago

The **LIVERPOOL**
and **LONDON**
and **GLOBE**
**INSURANCE CO., Limited**

80 WILLIAM STREET, NEW YORK

**Total Losses Paid in U. S. Exceed $142,000,000**

# THE Justrite TRADE MARK Fire Extinguisher and Fire Prevention DEVICES




A Fire Extinguisher minus the Fluid = equals a fire. A glance at this gauge indicates the fluid contents at all times. Never any doubt about your Justrite being ready for action. An exclusive Justright feature.

**Instantaneous in action—requires only one movement—first turn of the handle automatically opens the nozzle and discharges the Fluid. Held firmly under the arm it is easily operated, throwing a strong steady stream 30 feet without any waste of Fluid.**

***Justrite Fluid* is harmless—injures nothing but the fire—especially effective on *gasoline* or *oil*, and absolutely safe and sure on *electrical fires*. Will not freeze at 40° below zero.**

## PRICES

| | |
|---|---|
| Polished Brass..... | $7.00 |
| Nickel Plated..... | 8.00 |
| Enameled Wall Brackets . | .50 |
| Enameled Nickel Brackets. | .75 |
| Enameled Auto Brackets... | 1.00 |
| Nickel Auto Brackets..... | 1.50 |

Justrite Fluid, $1.00 per Quart.
1, 2 and 4-quart Cans.

**REDUCES INSURANCE RATES**

Approved, Tested and Inspected by the
**Underwriters Laboratories, Inc.**
Under Direction of
**The National Board of Fire Underwriters**

## The JUSTRITE AUTOMATIC OILY WASTE and SAFETY OIL CANS

**SAFETY—EFFICIENCY ECONOMY**

**Sold by leading dealers or sent postpaid on receipt of price—with Dealer's name. Write for Booklet.**

## Justrite Mfg. Co.

**Dept. E**
**345 So. Clinton St.**
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**5 GALLON $5.00**

### PRICE LIST

| Size exclusive of legs | | Net |
|---|---|---|
| No. 1 | 11¾ x 13..... | $2.00 Each |
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### SIZES AND PRICES

| | | | |
|---|---|---|---|
| 1 Pint | $1.25 | 1 Gallon | $2.00 |
| I Quart | 1.50 | 3 " | 4.00 |
| 2 " | 1.75 | 5 " | 5.00 |

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"STRONG AS THE STRONGEST"

**THE NORTHERN ASSURANCE CO.**

(LTD. OF LONDON)

ORGANIZED 1836 ENTERED UNITED STATES 1876

Losses Paid ..... $92,000,000
Losses Paid in U. S..... 31,000,000

Eastern and Southern Departments
55 John Street, New York.

**NEWMAN CLOCK COMPANY**

5 Makers of Watchman's Clocks for Forty Years.

New York Chicago Montreal London Geneva

# WANTS

**POSITIONS SEEKING MEN—MEN SEEKING POSITIONS**

SAFETY ENGINEER.—First class safety man, competent to fill the position of Superintendent or Chief Inspector of Casualty Insurance Company writing all lines of insurance, is desirous of corresponding with any firm in need of such a man. Thoroughly competent to organize and manage a department of any size. Steam boiler and Elevator expert. Inspection and accident prevention as understood in Liability and Workmen's Compensation, including the organizing of Safety Committees in Industrial establishments and the careful teaching of Safety generally in all its varied phases. Good Engineer. Good on reports. Handy with cameras. Best of credentials. Address 1709, SAFETY ENGINEERING.

COLLEGE graduate, mechanical engineer, 3 years' experience as safety engineer, desires engineering position with an insurance company or one leading to advertising, sales or cost departments with manufacturing concern. Address 1649, SAFETY ENGINEERING.

AN UNUSUAL MONEY MAKING OPPORTUNITY is now open to ambitious men who can devote either whole or part time to presenting to officials of manufacturing concerns throughout the country, the new and important work "Universal Safety Standards for Machine Shop and Foundry" in connection with subscriptions to SAFETY ENGINEERING. Write today for full particulars concerning this money-making proposition, one of the strongest ever offered. It is a chance for you to make money by selling something which will actually save money and make money for the purchasers. Secure exclusive territory, the field most convenient for you, before some other man claims it. Only men of proved responsibility accepted. Address 1542, SAFETY ENGINEERING.

WELFARE Department Manager, 37 years old, capable of taking complete charge of accident prevention organization, labor bureau and medical department in the city of New York Sound knowledge of Workmen's Compensation Act, Labor and Sanitary Laws. Offers from large establishments only will be considered. Address 1648, SAFETY ENGINEERING.

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**Universal Safety Exhibit, Panama-Pacific Exposition**

**THE NEWMAN GRILLE MODEL WATCH-CLOCK**

6 Safeguards the UNDERWRITERS' LABORATORIES—Chicago.

# Keep your Safety Bulletin Boards

## Supplied with Live Material

**The Weekly Bulletin Service of the**

## NATIONAL SAFETY COUNCIL

### Solves this problem

Each week's set consists of at least three distinct items which carry messages of CARE direct to your employees—enabling you to cut down that 75% of PREVENTABLE ACCIDENTS.

**This cut shows some of the Bulletins already distributed**

During 1914, the National Safety Council distributed 196 distinct items of this nature.

### FILL OUT THE COUPON AND MAIL IT

Learn how National Safety Council will help you reduce accidents—get posted on the various other service-features of which the bulletin distributions are only a part.

**Annual Membership dues are a mere trifle—the National Safety Council operates along non-profit lines. Hence you reap the benefit.**

To the National Safety Council,
Continental & Commercial Bank Bldg., Chicago, Ill.

Without obligation to me/us, please send folder relative to your organization—How its service can aid me/us

Name .....

Address .....

Business .....

No. of Employees.....

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*When at the Panama-Pacific Exposition*

*DON'T FAIL TO VISIT*

# THE UNIVERSAL SAFETY EXHIBIT

of products which safeguard life and property against fire and accident

## Under the Management of Safety Engineering

It is the headquarters of the Safety Movement at the Exposition and should be visited by all Safety Men

*DON'T FAIL TO VISIT IT*

## American Journal of Public Health

**A monthly magazine for Sanitary Engineers, Health Officers, Vital Statisticians, Laboratory Workers, Social Service Workers, physicians and others interested in preventive medicine.**

NEW DEPARTMENTS—1915.

**Current Public Health Literature**

Beginning with the February number, the Journal opens a new department containing a list of all articles published in domestic and foreign Journals on the subject of Public Health and its allied branches.

It will be indispensable as a reference for those whose work necessitates an up-to-date knowledge of late developments along these lines.

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**AMERICAN JOURNAL OF PUBLIC HEALTH**

755 Boylston Street, Boston, Mass.

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**Can You** at your client's request properly safeguard his plant?

**Do You** know the requirements of the Insurance Company that carries his policy?

**Can You** protect the client's interest without this knowledge?

**Do You** know these requirements are absolutely rigid and must be conformed to?

**Do You Want**

to become the best Safety Engineer or Architect in your community?

The advice that required two years' time and $100,000 to acquire?

The authoritative advice of the World's Greatest Safety Engineers?

***You must know it— Let us tell you how.***

Write for information today

**Universal Safety Standards Pub. Co.**

Suite 502, 80 Maiden Lane, New York

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IF you feel the need of "brushing up" occasionally on subjects that you have nearly forgotten because you have been busy with other lines of work—

IF you sometimes need to get a quick understanding of some special branch of insurance practice that affects your own work—

IF you have a good general knowledge of insurance practice, and desire a thorough understanding of its higher, better-paying positions—

IF you are constantly kept from advancement by your inexact knowledge of the principles upon which your work is based—

IF you want general information on any branch of fire-prevention or insurance, field or office work—

IF you have no knowledge of insurance practice, and want to understand it "from the ground up."

## Cyclopedia of Fire Prevention and Insurance

**Four Volumes; 1,800 pages, 7x10 inches; 765 special photographs, maps, diagrams, etc., Hundreds of valuable forms. Indexed for ready reference. Bound in half red American-Morocco; stamped in 14-carat gold.**

**The Cyclopedia of Fire Prevention and Insurance is the only work of its kind in existence. It covers the cause, prevention and handling of fires; the theory and practice of fire insurance; the protection and inspection of risks; the adjustment of losses, and the business operations involved. All matters of inspection, hazards, risks, ratings and schedules are exhaustively treated.**

**These Books Tell You** How insurance rates are made—How to build safely and well—Why you should build fireproof—The law of the policy—The history and growth of the insurance business—The fire-resisting qualities of concrete—The fire-resisting qualities of tile—How to protect steel from fire—The nature and uses of mill construction—How you should build your home—All about factory construction—All about factory mutual insurance—The true relation of insurance to property risk—All about spontaneous combustion—The hazard value of explosives and combustibles—Proper methods of electrical installation—All about the Universal Mercantile Schedule—All about the Dean Analytic Schedule—All about the brokerage business—The duties of an underwriter—How your loss should be adjusted—Fireproof construction vs. insurance—Why European fire losses are lower than American—Neighborhood fire liability plan—All about wire glass—The duties of an insurance inspector—How to protect your building by private appliances—All about automatic sprinklers—All about up-to-date fire-fighting appliances—How to handle hazardous manufacturing processes.

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**American Technical Society, Chicago:**

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Safety Eng. 6-15

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ADDRESS .....

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## *Steady, Brilliant Illumination Secured Wherever Required*

**Pilot**

**Acetylene Lighting Plants**

**On approved list issued by Underwriters' Laboratories**

**have demonstrated by years of successful service in thousands of installations that**

## *as a safe, economical means of lighting there is no equal*

### *Ideal for Isolated Communities*

Put your lighting problems up to our experts, they will study them and render an unbiased report without cost to you. Send today for

**FACTS ON LOW COST, HIGH GRADE LIGHTING**

For reliable, alert agents in territory not covered, we have a splendid money-making proposition. Get the facts concerning it before some other live man gets control of the territory you desire. No time like today to write.

## Oxweld Acetylene Company

**36th Street and Jasper Place, Chicago, Ill.**

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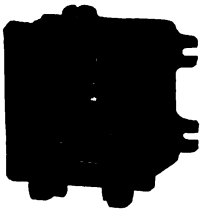
## "Square D" Steel Enclosed Switches
## "Detroit" Induction Motor Starters
## "Detroit" Iron Clad Switches

These are the ***first*** electrical devices of the kind to be given permission by the Underwriters' Laboratories to use their new Fire and Accident Casualty Label Service.

## It Pays to Be Safe

If you are interested in bringing your electrical equipment up to the highest standards of "Safety" from the fire and life hazard standpoints, these devices will help you realize those standards.

You should have complete information on these "Safety-First" devices. Will you write us ***now?***



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**1410 Rivard Street**
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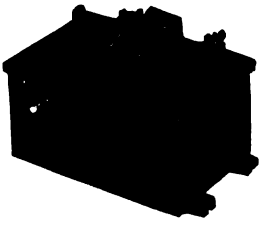


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# The finest thing that ever happened in this blessed country.

**But it needs to be passed along. How?**

## *By Education Work Co-operation*

***Being Your Brother's Keeper***

**Don't admit that there is any question about preventing ACCIDENTS. EXPERIENCE has proven that 70% of these accidents can be eliminated.**

## Striking Attention Arresting Signs With Character

**Are a big factor in this work**

**Our Signs Have These Qualities and Conform to Universal Safety Standards**

**Not just printed words on a steel plate but**

***SAFETY JUDGMENT SAFETY KNOWLEDGE***
***SAFETY INFORMATION—all in our Signs.***

**Full-sized colored illustrations of our line of signs sent on request. Also illustrated folder.**

**The Stonehouse Steel Sign Co.**
**1726 Lawrence Street - Denver, Col.**

*Members National Safety Council; American Mine Safety Assn.; Committee on Awards Safety Engineering.*

## A New Idea in "Safety First"

A sign like the one to the left will cause the Safety First idea to deeply penetrate in your employees' minds, thus

**securing personal carefulness**

We are specialists in Warning Signs made of Enameled Steel and Iron, Lithographed Steel and Embossed Metal. Put your warning sign problems up to us. We will solve them for you as we have those of many others.

***Write for New Illustrated Catalogue of Signs that will cause your employees to think***

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**3,500 of these double face signs furnished Public Schools, Chicago, in 1914**

## R. D. WOOD & CO.

**Engineers**
**Iron Founders**
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**Single and Double Valve**
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Just as a human guard, provided for the Safety of high officials, depends for its value and dependability upon the judgment displayed in the selection of its component parts; so the guard provided for the protection of human beings, depends for its efficiency and reliability upon the judgment shown in the selection of the right material for its construction.

**A Good Example of Efficient Guarding**

Experts in Guarding employ "Steelcrete" for the construction of their guards and protection devices because they know that

## "Steelcrete" Mesh

Steelcrete Registered

Offers per pound of material more protection than any other.

"Steelcrete" guards are indestructible and afford absolute protection at lowest possible cost.

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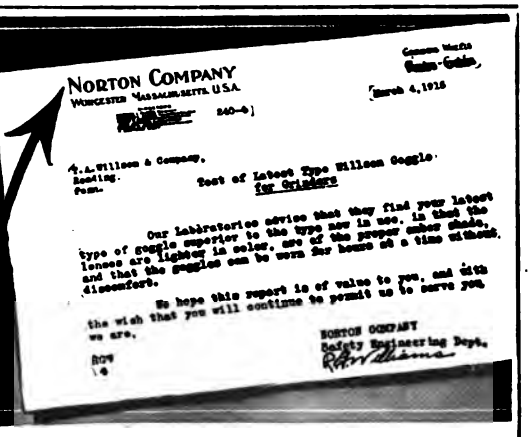
**101 East 40th Street New York**

**Chicago. Factory: Braddock, Pa.**



NORTON COMPANY
WORCESTER, MASSACHUSETTS, U.S.A.

March 4, 1915

T. A. Willson & Company,
Reading,
Penn.

Test of Latest Type Willson Goggle for Grinders

Our Laboratories advise that they find your latest type of goggle superior to the type now in use. In that the lenses are lighter in color, one of the proper amber shade, and that the goggles can be worn for hours at a time without discomfort.

We hope this report is of value to you, and with the wish that you will continue to permit us to serve you, we are,

NORTON COMPANY
Safety Engineering Dept.

# Worn for Hours— No Discomfort

say the laboratories of the Norton Company, Worcester, Mass. Naturally a large grinding wheel manufacturer is an authority on Eye Protection, as grinders' and machinists' eyes are constantly exposed to injury from flying particles. Such a recommendation of

## The New Willson Goggle

***"For Grinders, Machinists and Light Work"***

is in itself the result of a supreme test. And even this is still further substantiated by hundreds of other big plants such as the Carborundum Co. and the Bethlehem Steel Co., who use Willson's day in and day out. The Willson Goggle is comfortable because it's adjustable, light in weight and can be worn over other glasses. Price, $8.00 per dozen. Discount on large quantities.

Write for Special Bulletin and complete information.

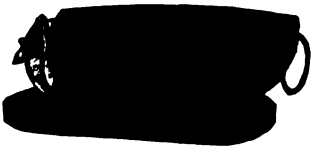
**T. A. Willson & Co., Inc.**

**READING, PA.**

***"Since 1870"***

Chicago, Mallers Building

San Francisco, Head Bldg. Toronto, 23 Scott St.



## Safe And Satisfactory Service FROM NORTON PROTECTION HOODS

The hoods on Norton Grinding Wheel "Model D" Stands protect from injury and dust.

Norton Stands are heavy and rigid. Rigidity gives long life to the machine and is the first step toward safety.

Many points of convenience that facilitate production are described in a bulletin. Send for it.

**NORTON COMPANY**
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**New York Store**
**151 Chambers Street**

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# *Preventives*

that will remove jeopardy and assure integrity of your plant and product.

## Our Automatic Engine Stops

To properly Safeguard your plant against accident **is good business.**
To properly Safeguard your property against damage suits **is wisdom.**
To properly Safeguard the lives of your employes **is your moral duty.**

**Horizontal Throttle Valve Stop**

Our Engine Stops, used by leading concerns in every industry, place your engine under constant surveillance and absolute control, are preventives in the best sense, as they absolutely insure against shut downs, or damage to life and property through fly-wheel explosions, and that is why there are more of our Automatic Engine Stops in use than all others combined.

Our Specialists on all types of engine stop and speed limiting devices are at your service without charge. Write today, don't wait for a fly-wheel explosion before investigating. Great losses of property, thousands of lives have been lost in plants where engineers were "quite positive their engines could not race."

**CONSOLIDATED ENGINE STOP CO., Inc.**
**351 West 38th Street** **New York**


*Remember You Saw It in Safety Engineering.*

*It has arrived!*

*What has arrived?*

# THE LABEL OF THE UNDERWRITERS' LABORATORIES

**Insurance and Safety Men will be interested in knowing that the**

# SURTY SAW GUARD
# JONES PRESS GUARD
# SURTY JOINTER GUARD

**now bear the Label of the Underwriters' Laboratories.**

The label has been awarded to these guards after improvements made necessary by the most thorough and painstaking tests of the laboratory experts.

This label is the medium through which the Workmen's Compensation Service Bureau expressed its approval of the guard which bears it.

***It is an official statement and endorsement made by experts as to guard efficiency.***

Because of such approval, the assured in any company or state affiliated with the Workmen's Compensation Service Bureau, using such guard is entitled to a differential in casualty rates according to the merit rating under the Universal Analytic Schedule.

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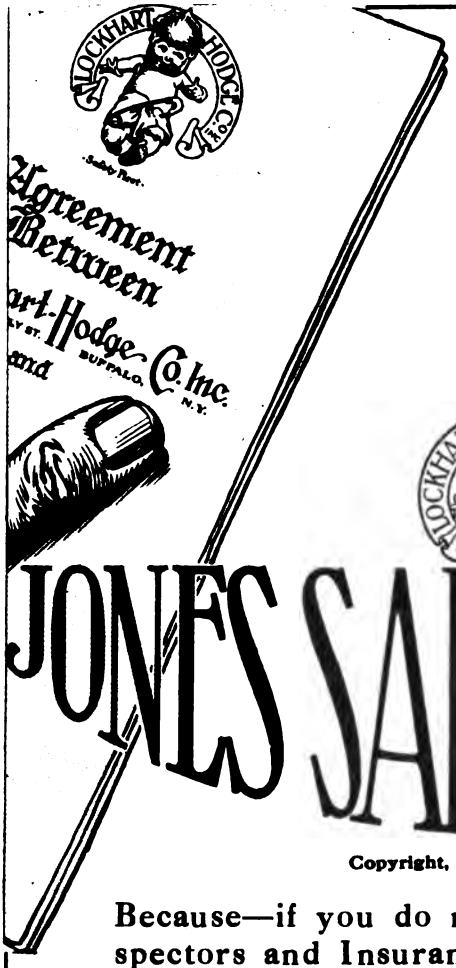
**62 E. Lake Street**
**CHICAGO, ILL.**
**Western Distributors**

***Look for the Underwriters' Laboratories' label on the guards you purchase—It is your guarantee of satisfaction.***




# You Guard Yourself when you insist on having

# JONES SAFETY GUARDS

Copyright, 1915, by Lockhart-Hodge Co., Inc.

**Because—if you do not have the kind which State Inspectors and Insurance Experts *agree* are right, you run almost as much risk as if your factory were guardless.**

## AND THIS BOND PROTECTS YOU

Safety authorities know that there are many inferior imitations of Jones Safety Guards. Many of them who have received copies of this Bond of ours which insures users against any chance of litigation rising from our patents, have heartily approved of the elimination of all possibility of doubt as to the desirability of Jones Safety Guards.

Factory Inspectors know that some of the imitations are cheaper in price. But they also know that not one of the infringing brands is as good a value as Jones Safety Guards. Write us today about your problem and let us send you catalogue and other literature. If you are not interested in the famous Jones Safety Guards for saws, etc., you will be interested in the new pamphlet on belt-guards which will protect moving belts and machinery in accordance with the most advanced state laws.

***Ask for Copy of our Patent-Protecting Bond—and Catalog***

## Lockhart-Hodge Co. Inc.

**OFFICES, WHITE BUILDING, BUFFALO, N. Y.**

**SOLE OWNERS AND MAKERS OF JONES SAFETY GUARDS FOR WOODWORKING MACHINERY IN U.S.A.**

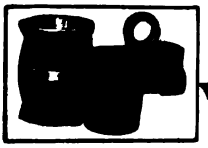
**In no way connected with Jones Safety Device Co.**

# The Lock and A Letter

STATE OF NEW JERSEY

DEPARTMENT OF LABOR

Trenton, N.J.,



Angell Elevator Lock Co.,
370 Atlantic Ave.,
Boston, Mass.

Gentlemen:-

I am very much pleased to write you that the Angell elevator lock, provided by your firm, on the freight elevators in the factory buildings of this State have proven entirely satisfactory and are acceptable to this Department.

Yours respectfully,

Commissioner of Labor.

2.

**From Maine to California, all over this broad land of ours,**

wherever elevators are used, in U. S. Government Buildings, Factories, Mills, Stores and Storehouses, Shops, Homes, Hotels, Hospitals, Etc.

***The Angell Elevator Floor Stop and Lock is daily saving life and property. Insuring "Safety First" in Elevator Service***

## The Angell Elevator Floor Stop and Lock

**Saves time, power and money as well as life and property**

## The Angell Noiseless Passenger Elevator Lock

**In addition to the above saves wear on nerves**

EST. Angell 1880

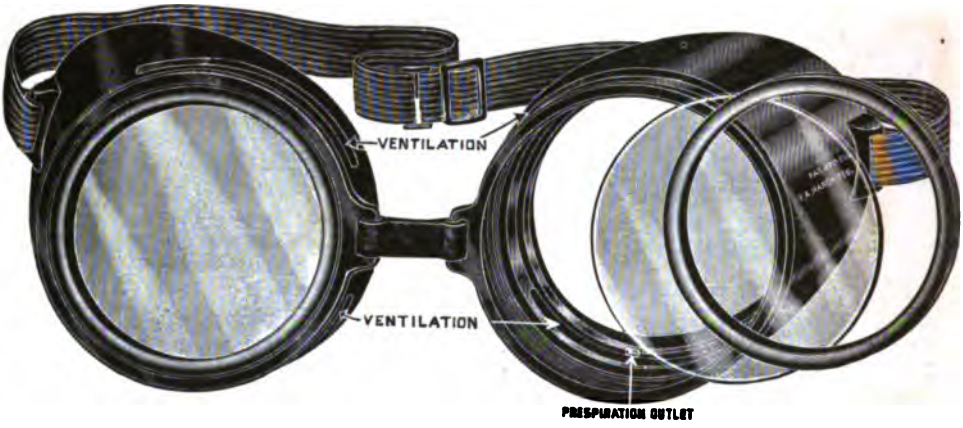
*For your own safety and that of your employes and patrons write for literature describing this Accident Eliminating Device. Do it today. Get the facts concerning this simple, safety insuring Elevator Floor Stop and Lock.*

## ANGELL ELEVATOR LOCK CO.

**BOSTON, MASS.**

*Remember You Saw It in Safety Engineering.*

# The Hardy Welding Glass




THE light-proof eye cups are made of a substance that is a non-conductor of both heat and electricity and are joined together by a leather binding. The glass is fully ventilated and supplied with perspiration outlets. Lenses easily changed as shown in illustration. Cover glasses to protect expensive welder lenses may also be fitted, and the welding glass is so supplied.

The lenses used are NOVIWELD and are superior in all respects to any lenses ever used for this purpose. They absolutely keep every harmful ray of light from passing through them to the eyes while affording the greatest possible amount of illumination.

Write for descriptive booklet of this glass
and for any style of safety glass desired.

**F. A. Hardy & Co.,** 10 So. Wabash Avenue, **Chicago, Ill.**

**Branches: 29 E. 22nd St., New York and at Denver, Atlanta and Dallas**

Showing Sprinkler with the two halves of the strut soldered together

# ROCKWOOD SAFETY LOOP SPRINKLER

Showing how the two parts of the soldered strut spring apart *only after* the lump of solder is *melted* away from the loop

THE Rockwood Sprinkler is unique in that the two parts of the soldered link are held together, not merely by a sweated soldered joint, but by covering the end of the lever with a small piece of solder which is mechanically bound to the strut by a loop of wire riveted through one part of the link.

The Rockwood Sprinkler is the only approved head that is incapable of opening itself by the breaking of the soldered joint, which must absolutely melt to open. It is thus in a class by itself, superior to all others.

## ROCKWOOD SPRINKLER CO.

OF MASSACHUSETTS

Manufacturers, engineers, and contractors for complete sprinkler equipments using wet or dry systems.

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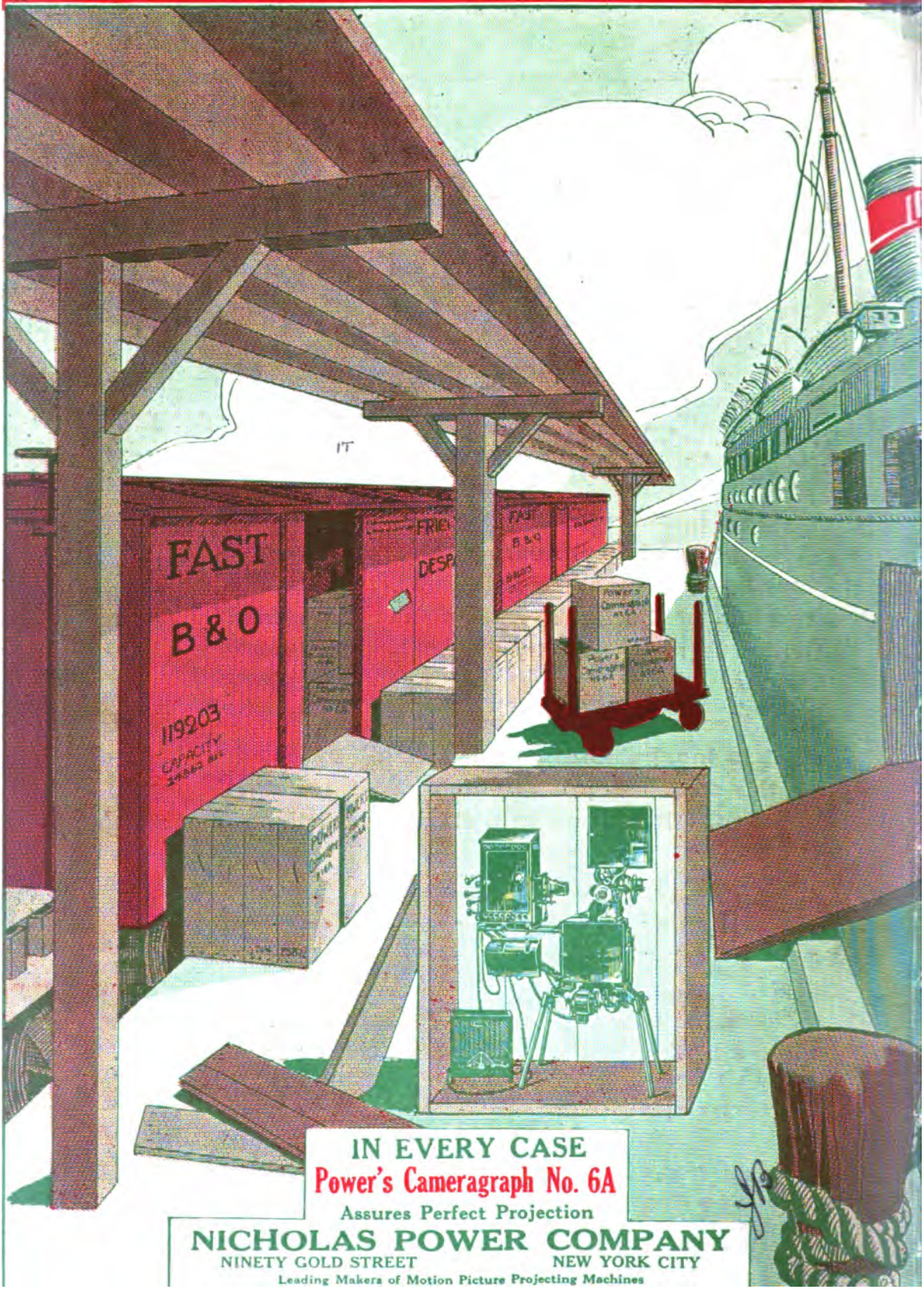
CHICAGO 3610 SOUTH MORGAN STREET
SEATTLE - - 208 COLUMBIA STREET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